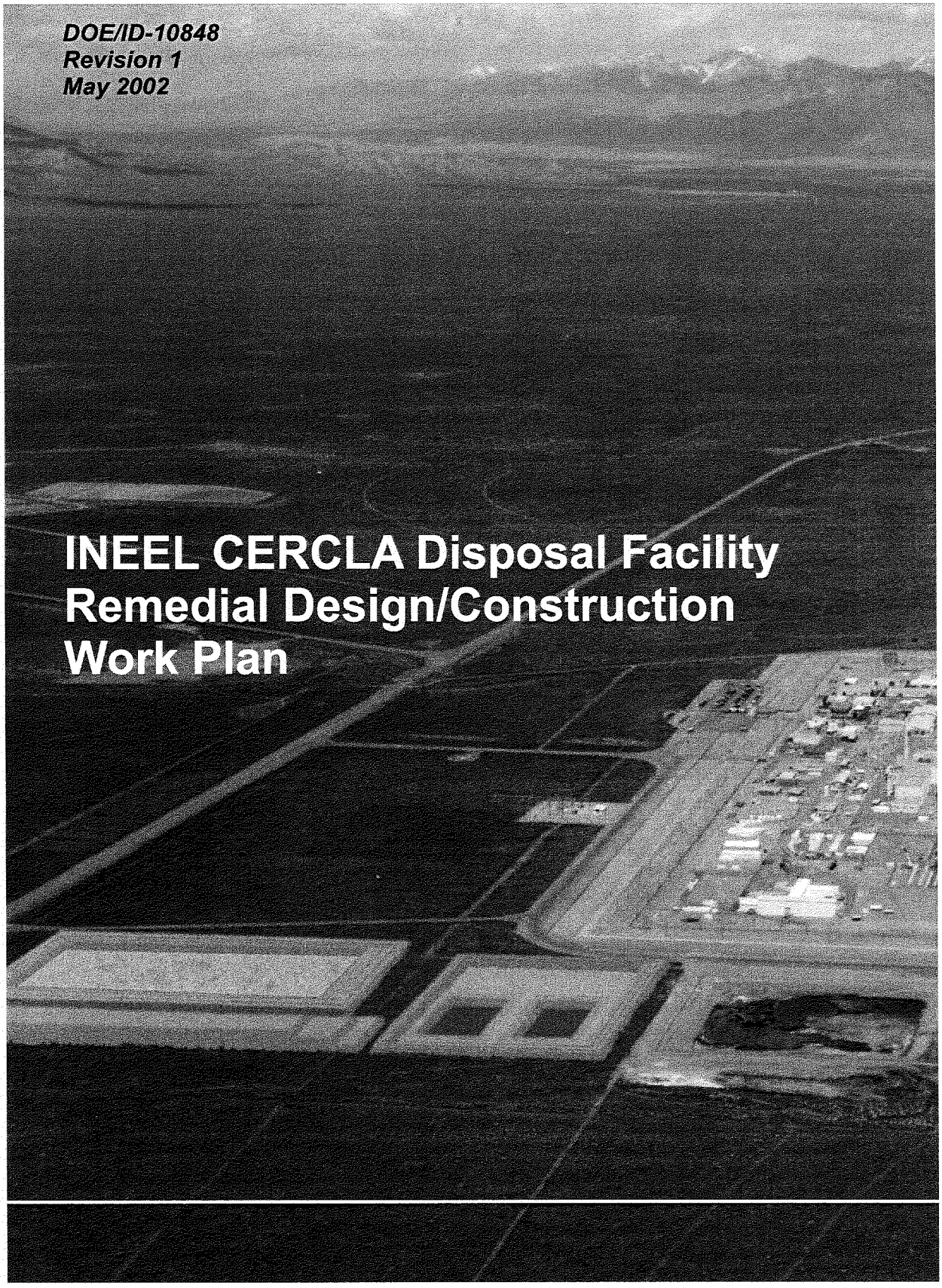
*DOE/ID-10848*
*Revision 1*
*May 2002*



# INEEL CERCLA Disposal Facility Remedial Design/Construction Work Plan

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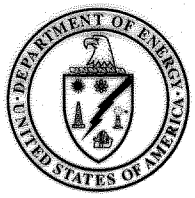
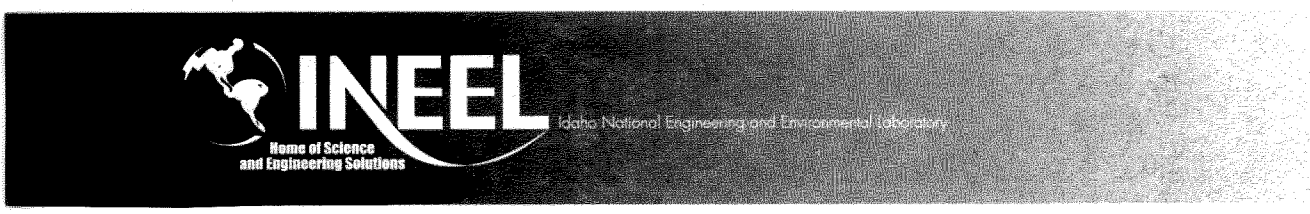



U.S. Department of Energy
Idaho Operations Office

# *INEEL CERCLA Disposal Facility Remedial Design/Construction Work Plan*



DOE/ID-10848
Revision 1

# INEEL CERCLA Disposal Facility Remedial Design/Construction Work Plan

May 2002

Prepared for the
U.S. Department of Energy
Idaho Operations Office

# ABSTRACT

This Remedial Design/Construction Work Plan provides the framework for design, and construction of the INEEL CERCLA Disposal Facility landfill, evaporation pond, and associated components at Operable Unit 3-13. This facility will be an engineered facility meeting DOE Order 435.1, Resource Conservation and Recovery Act Subtitle C, Idaho Hazardous Waste Management Act and Toxic Substances Control Act polychlorinated biphenyl landfill design and construction requirements. This work plan presents the design basis, design criteria, design requirements, and construction requirements for the various components that are part of the landfill and evaporation pond. Summaries of the construction work elements are presented herein, with a schedule for presenting the operational and management elements in the ICDF Remedial Action Work Plan.

# CONTENTS

**Appendix Volume 3 of 5—Design Analysis (continued)**



**Appendix Volume 4 of 5—Construction**



**Appendix Volume 5 of 5—Project Management and Supporting Design Files**

## Tables

# ACRONYMS

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| AFC | approved for construction |
| AOC | area of contamination |
| ARAR | applicable or relevant and appropriate requirement |
| ASCE | American Society of Civil Engineers |
| ASME | American Society for Mechanical Engineers |
| BLM | Bureau of Land Management |
| BRA | Baseline Risk Assessment |
| CAMU | Corrective Action Management Unit |
| CCL | compacted clay liner |
| CDR | Conceptual Design Report |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CIDs | construction interface documents |
| COC | contaminants of concern |
| CQA | Construction Quality Assurance |
| DOE | Department of Energy |
| DOE-ID | Department of Energy Idaho Operations Office |
| DOE O | Department of Energy Order |
| EDF | Engineering Design File |
| EAM | emergency action manager |
| EPA | Environmental Protection Agency |
| RE | Environmental Restoration |
| FFA/CO | Federal Facility Agreement and Consent Order |
| GCL | geosynthetic clay liner |

| | |
|---|---|
| HASP | Health and Safety Plan |
| HDPE | high-density polyethylene |
| HI | hazard index |
| HWMA | Hazardous Waste Management Act |
| ICDF | INEEL CERCLA Disposal Facility |
| IDAPA | Idaho Administrative Procedures Act |
| IDEQ | Idaho Department of Environmental Quality |
| INEEL | Idaho National Engineering and Environmental Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| ITD | Idaho Transportation Department |
| LCS | leachate collection system |
| LDRS | leak detection recovery system |
| MCL | maximum contaminant levels |
| MEI | maximally exposed individual |
| NCP | National Contingency Plan |
| NEA | Nuclear Energy Agency |
| NFPA | National Fire Protection Association |
| NOAA | National Oceanic and Atmospheric Administration |
| O&M | operation and maintenance |
| OSHA | Occupational Safety and Health Administration |
| OU | operable unit |
| P&ID | process and instrumentation diagram |
| PC | Performance Category |
| PCB | polychlorinated biphenyl |
| PICS | process instrumentation and control system |
| PLN | Plan |

| | |
|---|---|
| QA | quality assurance |
| QPP | quality program plan |
| RA | remedial action |
| RAWP | remedial action work plan |
| RAOs | remedial action objectives |
| RCRA | Resource Conservation and Recovery Act |
| RCT | radiological control technician |
| RD | remedial design |
| RD/C | remedial design/construction |
| RD/CWP | Remedial Design/Construction Work Plan |
| RD/RA | remedial design/remedial action |
| RFP | request for proposal |
| RI/FS | remedial investigation/feasibility study |
| ROD | Record of Decision |
| SBL | soil bentonite liner |
| SOW | Scope of Work |
| SPC | Specification |
| SRPA | Snake River Plain Aquifer |
| SSA | Staging and Storage Area |
| SSSTF | Staging, Storage, Sizing, and Treatment Facility |
| TBC | to be considered |
| TFR | Technical and Functional Requirement |
| TRU | transuranic |
| TSCA | Toxic Substances Control Act |
| UBC | Uniform Building Code |
| UNEP | United Nations Environmental Program |

| | |
|---|---|
| VDS | vendor data submittals |
| WAC | Waste Acceptance Criteria |
| WAG | waste area group |
| WMP | Waste Management Plan |
| WP | Work Plan |
| WPP | Waste Placement Plan |

# INEEL CERCLA Disposal Facility Remedial Design/ Construction Work Plan

## 1. INTRODUCTION

In accordance with the Idaho National Engineering and Environmental Laboratory (INEEL) Federal Facility Agreement and Consent Order (FFA/CO) (DOE-ID 1991) between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Idaho Department of Environmental Quality (IDEQ), hereafter referred to as the Agencies, the DOE submits the following Remedial Design/Construction Work Plan (RD/CWP) for the design and construction of the INEEL CERCLA Disposal Facility (ICDF) at the Idaho Nuclear Technology and Engineering Center (INTEC). Under the current remediation management strategy outlined in the FFA/CO, the location identified for the construction of the ICDF is designated as part of Waste Area Group (WAG) 3, Operable Unit (OU) 3-13 at INEEL.

The RD/CWP activities identified in this work plan, as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, will proceed in accordance with the signed OU 3-13 Final Record of Decision (ROD) (DOE-ID 1999) and the RD/RA Scope of Work (SOW) (DOE-ID 2000a) for WAG 3, OU 3-13.

This RD/CWP provides the framework for defining the remedial design (RD) requirements, preparing the design documentation, and defining and implementing the construction of the ICDF at INTEC, one of the major components of the selected remedy for the OU 3-13 Group 3, Other Surface Soils. The Agencies and DOE plan to develop operational and management plans in a separate document known as the Remedial Action Work Plan (RAWP). The ICDF Complex RAWP will be developed as a primary document under the FFA/CO, and will be presented to the Agencies for comment and finalization during the summer of 2002.

### 1.1 Background

The INEEL is a government facility managed by the DOE, located 51.5 km (32 mi) west of Idaho Falls, Idaho, that occupies 2,305 $km^2$ (890 $mi^2$) of the northeastern portion of the Eastern Snake River Plain. Facilities at the INEEL are primarily dedicated to nuclear research, development, and waste management. Surrounding areas are for multipurpose use and are managed by the U.S. Bureau of Land Management (BLM). The developed area within the INEEL is surrounded by a 1,295-$km^2$ (500-$mi^2$) buffer zone used for cattle and sheep grazing. Communities nearest to the INTEC are Atomic City (south), Arco (west), Butte City (west), Howe (northwest), Mud Lake (northeast), and Terreton (northeast). In the counties surrounding the INEEL, approximately 45% of the land is agricultural, 45% is open land, and 10% is urban. Sheep, cattle, hogs, poultry, and dairy cattle are produced, and potatoes, sugar beets, wheat, barley, oats, forage, and seed crops are cultivated. Private individuals or the U.S. Government own most of the land surrounding the INEEL.

The INTEC, formerly known as the Idaho Chemical Processing Plant, is located in the south-central portion of the INEEL in southeastern Idaho, as shown in Figure 1-1. From 1952 to 1992, operations at INTEC primarily involved reprocessing spent nuclear fuel from defense projects. Liquid waste generated from the reprocessing activities, which ceased in 1992, is stored in several underground storage tanks at INTEC.

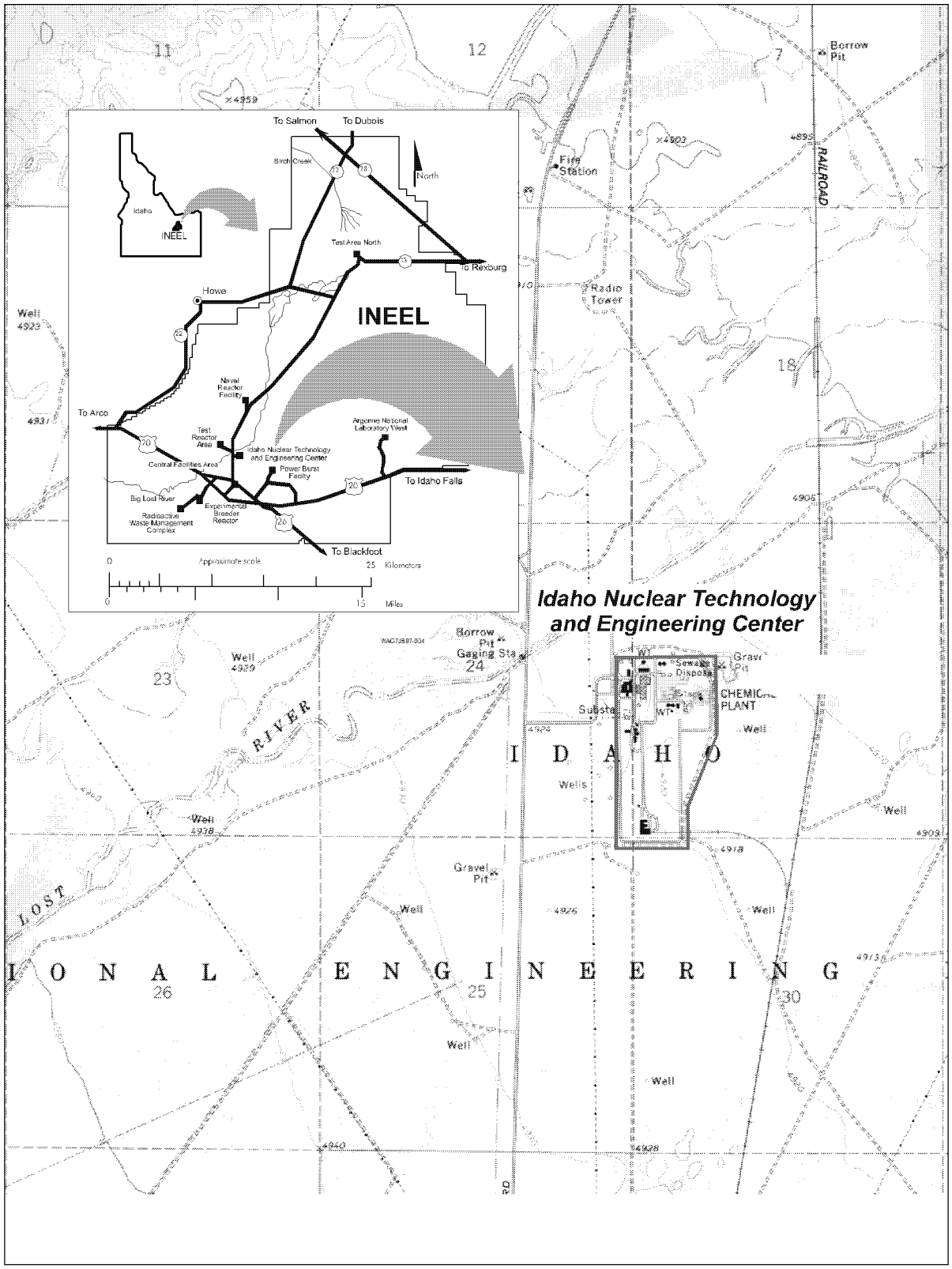



Figure 1-1. Location of INTEC within the INEEL.

The FFA/CO designates INTEC as WAG 3. Identified contaminant release sites at WAG 3 were grouped into several OUs to better manage environmental investigations and expedite the investigations and any required remedial actions (RAs). OU 3-13 was designated in the FFA/CO and Action Plan as the Comprehensive Remedial Investigation/Feasibility Study (RI/FS) (DOE-ID 1997), which culminated with the OU 3-13 ROD. The OU 3-13 ROD provides selected remedies or interim action until final remedy selection for 55 release sites identified at INTEC, which, on the basis of the RI/FS for WAG 3, OU 3-13, were identified as posing a potential risk or threat to human health and/or the environment. Of the 46 other potential release sites, 40 sites are identified in the ROD as "No Action" or "No Further Action." The remaining six sites will be managed under other OUs, WAGs, or INEEL regulatory programs.

The 55 release sites with identified risks greater than $1 \times 10^{-4}$ or that pose a threat to human health and/or the environment require remedial action to mitigate these risks or threats. The 55 sites were divided into seven groups based on similar media, contaminants of concern (COC), accessibility, or geographic proximity:

- Group 1: Tank Farm Soils
- Group 2: Soils Under Building and Structures
- Group 3: Other Surface Soils
- Group 4: Perched Water
- Group 5: Snake River Plain Aquifer (SRPA)
- Group 6: Buried Gas Cylinders
- Group 7: SFE-20 Hot Waste Tank System.

As part of the selected remedy for Group 3, the ICDF Complex will be constructed at INTEC, as shown in Figure 1-2, to allow on-Site disposal of WAG 3 and other CERCLA-generated wastes at the INEEL. The ICDF landfill will be an engineered facility meeting the substantive requirements of Resource Conservation and Recovery Act (RCRA) Subtitle C design and construction, with a capacity of about 389,923 $m^3$ (510,000 $yd^3$) (DOE-ID 1999).

The remedial strategy for Group 3 is described in three primary documents:

- The Staging, Storage, Sizing, and Treatment Facility (SSSTF) RD/CWP describes SSSTF design and construction (DOE-ID 20002g)
- The ICDF RD/CWP describes landfill and evaporation pond design and construction
- The ICDF Complex RAWP will describe operations and management aspects of the ICDF Complex (landfill, evaporation pond, and SSSTF).

A separate plan will be developed for the design and implementation of the remedy for the contaminated Group 3 soils to excavate and transport the Group 3 soils to the ICDF Complex (either directly to the landfill or evaporation pond, or to the SSSTF for treatment prior to disposal).

This RD/CWP and included Title II design documents are for the ICDF landfill and evaporation pond design and construction. Separate construction work plans and design documentation will be

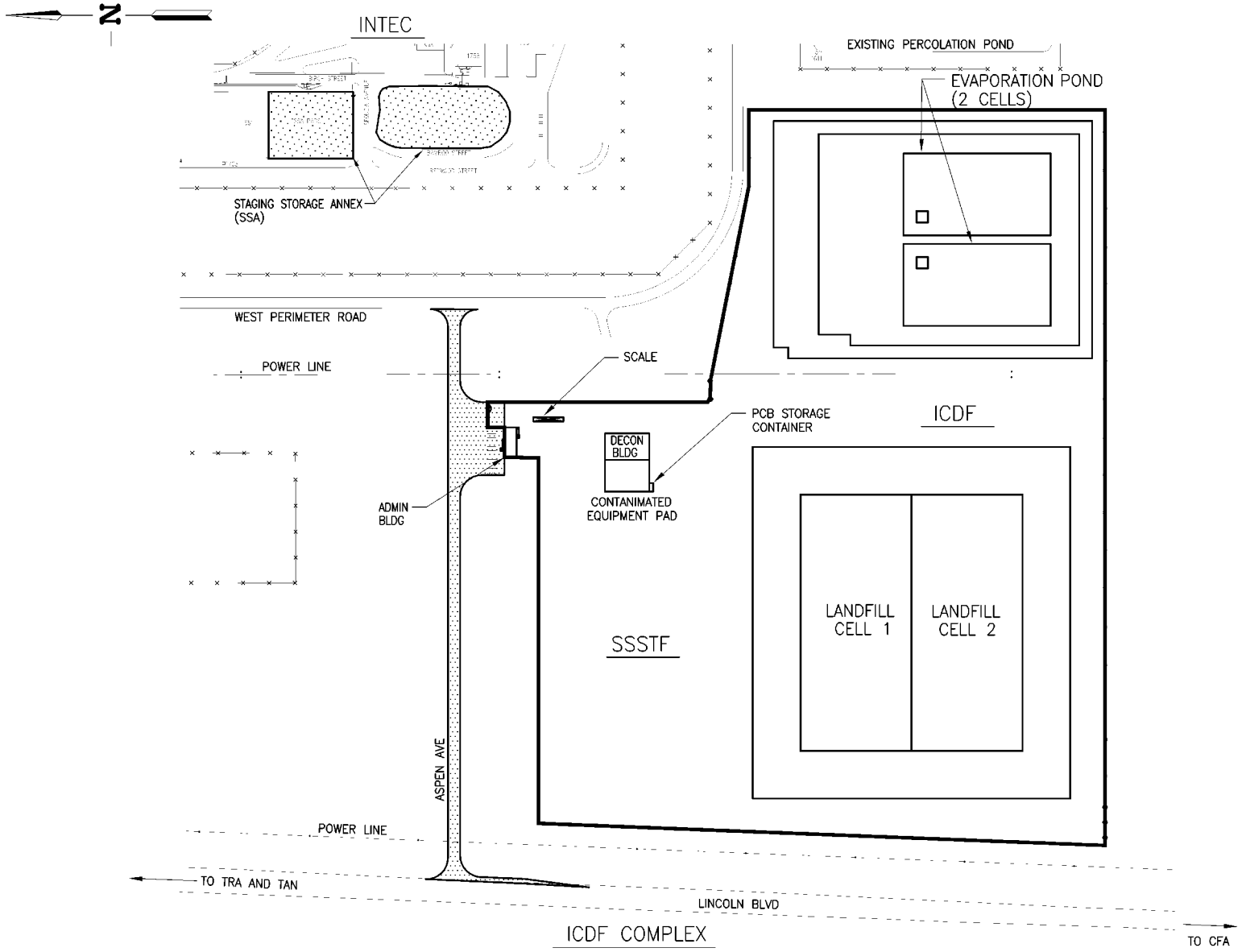



Figure 1-2. Location of the ICDF Complex.

prepared for the SSSTF and the Group 3 soils, in accordance with the OU 3-13 RD/RA SOW (DOE-ID 2000a). The Draft SSSTF RD/RA Work Plan was submitted to the Agencies in August 2001 for FFA/CO review. The ICDF RD/RA Work Plan was submitted to the Agencies in December 2001 for FFA/CO review. In early 2002, the Agencies and the DOE agreed to outline remedial design and construction issues for the SSSTF in a RD/CWP. As a result of this agreement, the ICDF RD/RAWP has also been revised to describe only the design and construction issues associated with building the landfill and evaporation pond. Operational and management issues for both SSSTF and ICDF will be discussed in a Remedial Action Work Plan for the entire ICDF Complex. This ICDF RD/CWP refers to components of the SSSTF RD/CWP, as necessary.

## 1.2 Selected Remedy

Based on consideration of the requirements of CERCLA, the detailed analysis of alternatives, and public comments, the Agencies selected Removal and On-Site Disposal for Group 3, Other Surface Soils. The ICDF Complex will be constructed under the selected remedy. The ICDF landfill will be engineered to meet the substantive requirements of the Toxic Substances Control Act (TSCA) and RCRA for the purpose of final disposal of wastes.

In addition to accepting WAG 3 CERCLA-generated waste, the ICDF landfill will also be designed to function as an INEEL-wide disposal facility to accommodate the disposal of CERCLA soils and debris from other WAGs. The SSSTF will be the receiving facility for CERCLA wastes for the ICDF Complex. The ICDF Complex will include the design and construction of an evaporation pond, which was designated by the ROD as a Corrective Action Management Unit (CAMU). The evaporation pond will be designed and constructed to treat ICDF landfill leachate, other aqueous wastes generated during operations, and INEEL CERCLA aqueous wastes that meet the ICDF evaporation pond Waste Acceptance Criteria (WAC).

The ICDF landfill will be a modular design, consisting of two cells, with a total capacity of 389,923 $m^3$ (510,000 $yd^3$). The first cell, Cell 1, will be constructed first, and construction of Cell 2 will proceed as needed. Contaminated soils will be permanently contained in this engineered facility, which is designed for long-term protection of human health and the environment. Institutional controls will be maintained at the ICDF Complex as long as necessary to ensure long-term protection.

The ICDF landfill and evaporation pond will reduce the overall areal extent of soil, liquid, and debris contamination at INTEC and the INEEL, and will achieve cost savings relative to off-Site disposal, or on-Site management, because the contaminated media will be managed in a central facility. Major elements of the selected remedy relevant to the ICDF landfill and evaporation pond are presented in the RD/RA SOW (DOE-ID 2000a), and are presented here:

1. Construct the ICDF Complex, which will include an engineered landfill meeting the substantive requirements of RCRA Subtitle C, Idaho Hazardous Waste Management Act (HWMA) and polychlorinated (PCB) landfill design and construction requirements.

2. The ICDF Complex will be located within the WAG 3 area of contamination (AOC). Design and operational requirements for the ICDF landfill and evaporation pond include:

    a. Dispose only INEEL on-Site CERCLA wastes meeting the Agency-approved ICDF Landfill WAC, to be developed during the RD, in the ICDF. An important objective of the WAC will be to assure that hazardous substances disposed in the ICDF landfill will not result in exceeding groundwater quality standards in the underlying drinking water of the SRPA, even if the ICDF landfill leachate collection system (LCS) were to fail after closure.

b. Design to have a total capacity of approximately 390,000 $m^3$ (510,000 $yd^3$).

c. Engineer to meet Idaho Administrative Procedures Act (IDAPA) 58.01.05.008[a] (40 Code of Federal Regulations [CFR] 264.301) for hazardous waste, 40 CFR 761.75 for PCB, and DOE Order 435.1 for radioactive waste landfill design and operating substantive requirements.

d. Locate in an area meeting hazardous waste, PCB waste, and low-level radioactive waste landfill siting requirements. Through a preliminary evaluation of all the relevant decision criteria, the Agencies have determined the "Study Area" for siting the ICDF landfill and evaporation pond to be the CPP-67 Percolation Ponds and adjacent areas to the west. However, the specific ICDF landfill cell locations will be determined through the completion of a comprehensive geotechnical evaluation of the entire Study Area, which shall be reviewed and approved by the Agencies. Siting criteria for the location of the ICDF landfill and evaporation pond included the following:

   (1) Outside the 100-year floodplain

   (2) Outside of wetland areas

   (3) Not in active seismic zones

   (4) Not in high surface erosion areas

   (5) Not in an area of high historic groundwater table.

e. Construct and designate an evaporation pond as a CAMU in accordance with the substantive requirements of IDAPA 58.01.05.008 (40 CFR 264.552 and 40 CFR 264 Subparts K and CC).

f. Operate, close, and post-close the ICDF Complex in accordance with the substantive requirements of IDAPA 58.01.05.008 (40 CFR 264 Subparts G, F, and N), and maintain site access restrictions and institutional controls throughout the post-closure period.

## 1.3 Preparatory Design Activities

Initial design activities for the ICDF landfill and evaporation pond were first presented in the Conceptual Design Report (CDR) for the INEEL CERCLA Disposal Facility and Evaporation Pond (DOE-ID 2000b). Geotechnical data to support the CDR was presented in the Geotechnical Report for the Conceptual Design (DOE-ID 2000c). The CDR provided a conceptual design of the ICDF landfill and evaporation pond. Also included in the ICDF CDR were the design criteria, project basis, schedule and

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a. The IDAPA citations indicated in the ROD were from the 16 series (e.g., 16.01.05.011). Subsequent reorganization of the State of Idaho resulted in the movement of the IDEQ's regulations from the 16 series to the 58 series (e.g., 58.01.05.011). While the IDAPA applicable or relevant and appropriate requirements (ARARs) are noted in this document as the 58 series for clarity and ease of reference, the ARARs were established at the signature of the ROD; any change in the IDAPA ARARs due to the series move (or promulgation of new regulations), is not applicable for the ICDF landfill or evaporation pond remedial action.

acquisition strategy, and project cost estimate. Following Agency review, comment resolution, and incorporation, the CDR was finalized (DOE-ID 2000b).

Following finalization of the CDR, title design was initiated. Title I design activities were initiated by the preparation of the Draft Title I (30%) design package. Following Agency review and comment resolution, the Final Title I (30%) design package was completed and finalized. The documentation developed as part of the Title I design effort is referenced and part of the Title I Master Table of Documents (DOE-ID 2001a).

Subsequent design for early construction activities for excavation of the landfill and evaporation pond, and construction of the test pad resulted in the Early Excavation and Test Pad approved for construction (AFC) design package, which included construction drawings and specifications. The Early Excavation and Test Pad design components were also reviewed by the Agencies; following the resolution and incorporation of comments, the Early Excavation and Test Pad documents were finalized. The documentation developed as part of the Early Excavation and Test Pad AFC design is referenced and part of the Excavation and Test Pad Master Table of Documents (DOE-ID 2001b).

Title design continued with the preparation of the 60% design package, which included several elements requested for further intermediate design by the Agencies. Agency comments on the 60% design package have been resolved and incorporated in the final 60% design package. The documentation developed as part of the 60% design is referenced and part of the 60% Design Components Master Table of Documents (DOE-ID 2001c).

This RD/CWP presents the Title II (90%) design for the ICDF landfill and evaporation pond. It is the culmination of a focused design effort for the ICDF landfill and evaporation pond. Elements of this RD/CWP are described in Section 1.4. In addition to the components identified in Section 1.4, several elements of the design effort have been finalized separately from this RD/CWP, in earlier design documentation phases. These design elements include the following documents:

- "Pond Lining System Equivalency Analysis," (Engineering Design File [EDF]-Environmental Restoration [ER]-312) was finalized as part of the 60% design submittal. The equivalency analysis evaluates the regulatory requirements for the evaporation pond liner system, and evaluates an alternate liner system design using the equivalency approach indicated in the regulations. The equivalency analysis concludes that the proposed alternate liner system is equivalent to the prescriptive liner system in the regulations, and provides several operational benefits. This EDF is not included as a component of this RD/CWP, but is available for information as part of the final 60% design package. During Agency comment resolution and finalization of EDF-ER-312 in the 60% design, it was decided that the proposed evaporation pond liner system would include a 0.9 m (3 ft) operations layer between the liners to serve as frost protection. EDF-ER-312 will not be revised to indicate the new design, which is presented in the design drawings (Appendix Z) and further described in Sections 3.9 and 5.1.2 of this RD/CWP.

- "Waste Placement Mapping Plan," (EDF-ER-322) was finalized as part of the 60% design submittal. The plan evaluates and provides a recommendation regarding how wastes will be mapped and tracked during placement in the ICDF landfill. The plan evaluates two alternative tracking methods currently used at other DOE sites and provides additional information regarding the recommended approach for tracking wastes. This EDF is not included as a component of this RD/CWP, but is available for information as part of the final 60% design package.

- "Evaporation Pond Berm Overtopping Analysis," (EDF-ER-323) was finalized as part of the 60% design submittal. This analysis discusses the procedures and findings for the analysis of wind

setup, wave generation, and wave runup in the east and west ICDF evaporation ponds. This EDF is not included as a component of this RD/CWP, but is available for information as part of the final 60% design package.

## 1.4 Work Plan Organization

As previously discussed, the remedial action strategy for Group 3 is described in three separate documents. The design and construction tasks for the SSSTF are presented in the SSSTF RD/CWP. This RD/CWP presents the design and implementation strategy for the ICDF landfill and evaporation pond. Operational and management issues for the landfill and evaporation ponds will be discussed in detail as part of the ICDF Complex RAWP, which will be submitted to the Agencies for comment and finalization during the summer of 2002. The ICDF RD/CWP is comprised of several volumes, which are indicated below along with the contents of each volume. The following are brief descriptions of the work plan sections and appendices.

**Remedial Design/Construction Work Plan**

- Section 1, Introduction, provides the description of this ICDF RD/CWP, describes the background and history of the INEEL, INTEC, and the designation of the ICDF for on-site disposal of INEEL CERCLA wastes, and gives an overview of the selected remedy identified in the OU 3-13 ROD. The section also describes the proposed document strategy adopted by DOE and the Agencies after the ICDF RD/RA Work Plan was submitted in December 2001.

- Section 2, Design Basis, provides an overview of the project components, the design criteria for construction of the ICDF landfill and evaporation pond, related design codes, standards, and applicable documents, ARARs, design assumptions, and quality assurance (QA).

- Section 3, Remedial Design, summarizes the RD of the ICDF landfill and evaporation pond, including descriptions of the physical site, design studies, site preparation, earthwork, liner installation, piping, warning signs and brass corner markers, surface water, erosion protection, construction staging, and groundwater monitoring.

- Section 4, Human Health and Environmental Compliance, provides a discussion of the remedial action objectives (RAOs), ARARs, and the compliance strategy associated with the RD/CWP.

- Section 5, Construction Work Plan, includes the management approach for construction of the landfill and evaporation pond, including the subcontracting plan, the construction work elements, the project schedule and reference to the project cost estimate, field oversight and construction management, inspections, reference to the operation and maintenance (O&M) plan, protocol for construction and field oversight, and references to the waste minimization plan, health and safety plan (HASP), and waste management plan. Section 5 also includes a discussion of the closure of the ICDF landfill and evaporation pond.

- Section 6, Five-Year Review, provides the basis for five-year reviews and addresses associated procedures, protocols, and documents.

- Section 7, References, is a list of referenced material from the body of the RD/CWP. Separate documents included in this RD/CWP, such as EDFs and separate DOE-ID documents, have separate reference sections.

**Remedial Design/Construction Work Plan Appendices**

*Appendix Volume 1 of 5—Design Analyses*

- Appendix A, "Leachate/Contaminant Reduction Time Study," EDF-ER-274, provides an analysis of the change in leachate concentration over the 15-year operations period of the ICDF landfill, based on the design inventory.

- Appendix B, "Fate and Transport Modeling Results and Summary Report," EDF-ER-275, provides complete groundwater modeling to support initial development of the landfill WAC.

- Appendix C, "Liner/Leachate Compatibility Study," EDF-ER-278, evaluates the compatibility of the liner materials with the leachate generated by the waste disposed in the ICDF landfill, using experience at similar landfills and published literature.

*Appendix Volume 2 of 5—Design Analyses (continued)*

- Appendix D, "Evaluation of Geotechnical Investigations Required to Complete Design and Construction," EDF-ER-276, presents the results of an evaluation of existing geotechnical information, which was found to be thorough and complete to prepare the ICDF landfill and evaporation pond design.

- Appendix E, "Seismic Evaluation of Landfill and Evaporation Pond," EDF-ER-282, discusses the methodology that is used to evaluate the stability of the ICDF landfill and evaporation pond under seismic loading. This evaluation is based on information contained in the site-specific seismic design standards established for the INEEL.

- Appendix F, "Subsurface Consolidation Calculations," EDF-ER-266, determines the amount of settlement that is expected to occur in the subsurface soils beneath the landfill. The calculated settlements are used to determine the deformation in the liner system to determine the necessary integrity of the landfill liner system.

- Appendix G, "Slope Stability Assessments," EDF-ER-268, documents the slope stability evaluations that support the design of the ICDF landfill and evaporation pond liner systems. The stability assessments include veneer stability, global stability, and stability after excavation.

- Appendix H, "Landfill Compaction/Subsidence Study," EDF-ER-267, predicts the amount of subsidence in the cover of the ICDF landfill, caused by consolidation of the subsurface soils underlying the landfill, waste material settlement, and settlement in the cover itself. Recommendations for the final slope of the cover, as well as waste compaction recommendations to reduce settlement are also presented.

- Appendix I, "Waste-Soil Design Ratio Calculations," EDF-ER-277, analyzes different types of potential debris that are anticipated to be disposed at the ICDF landfill, and determines the amount of soil that will be required to provide a stable fill to protect the permanent cover system for the landfill.

- Appendix J, "Liner and Final Cover Long-Term Performance Evaluation and Final Cover Life Cycle Expectation," EDF-ER-281, provides the basis for engineering analyses for designing the ICDF landfill liner and cover system. This study also demonstrates compliance with the required liner and cover service life.

- Appendix K, "Landfill Leachate Collection System Design Analysis," EDF-ER-280, includes design parameters for the LCS, such as maximum flow rates through the leachate media and pipes, sump discharges and recirculation piping, drainage layers, sump pumps, and discharge piping to the evaporation ponds.

- Appendix L, "Evaporation Pond Sizing with Water Balance and Make-up Water Calculations," EDF-ER-271, calculates the necessary size of the evaporation ponds based on the maximum expected inflow, while minimizing both pond surface area and make-up water requirements.

- Appendix M, "Hydrologic Modeling of Final Cover," EDF-ER-279, estimates the long-term infiltration rates through the ICDF final cover to determine percolation from the base of the cover. The modeling effort evaluated the performance of the landfill cover by determining surface run-off, infiltration through the upper soil component of the cover system, lateral drainage, and cover defects. Based on the hydrologic modeling presented in this document, the ICDF landfill cover design represents the best technology for minimizing infiltration into the landfill given site-specific climatic conditions.

***Appendix Volume 3 of 5—Design Analyses (continued)***

- Appendix N, "IDAPA Preliminary Air Screening Results," EDF-ER-315, presents the calculations for the unabated off-Site dose rate ($\mu g/m^3$) to the maximally exposed individual (MEI) resulting from air emissions due to remediation activities at the ICDF Complex. The system being evaluated includes O&M of the ICDF landfill, evaporation pond, and SSSTF.

- Appendix O, "ICDF Complex NESHAP Modeling," EDF-ER-290, presents the modeling methodology and dose rates (in mrem/yr) to the maximally exposed individual (MEI) resulting from radioactive air emissions due to remediation activities at the ICDF landfill and evaporation pond, including operations and management.

- Appendix P, *Waste Acceptance Criteria for ICDF Landfill*, DOE/ID-10865, provides the basis for the quantities of radioactive and hazardous wastes allowable in waste designated for disposal in the ICDF landfill. Compliance with the requirements of this ICDF Landfill WAC will ensure protection of human health and the environment, including protection of the SRPA.

- Appendix Q, *Waste Acceptance Criteria for ICDF Evaporation Pond*, DOE/ID-10866, provides the basis for the quantities of radioactive and hazardous COCs that may be present in the aqueous wastes disposed in the ICDF evaporation pond. Compliance with the requirements of the ICDF evaporation pond WAC will ensure protection of human health and the environment.

- Appendix R, "Screening Level Ecological Risk Assessment," EDF-ER-311, provides risk calculations for ecological receptors and evaluates the ICDF Complex's potential environmental impacts.

- Appendix S, "ICDF Complex Groundwater Monitoring Plan," DOE/ID-10955, provides the ICDF Complex groundwater monitoring approach, both during operations and following closure of the landfill. Samples will be collected under this plan to monitor for releases from the ICDF landfill and evaporation pond.

- Appendix T, "Waste Placement Plan," EDF-ER-286, provides direction for waste placement procedures and operational requirements associated with the landfill.

*Appendix Volume 4 of 5—Construction*

- Appendix U, "INEEL CERCLA Disposal Facility Test Pad Construction Report," EDF-2899, provides a summary of the test pad construction, performed during calendar year 2001, and evaluates the construction of the test pad against the established construction quality standards.

- Appendix V, "Storm Water Pollution Prevention Plan for the ICDF Landfill and Evaporation Pond," Plan (PLN)-962, provides the approach for storm water control during Stage II construction, and also includes the plan for storm water pollution prevention during the ICDF operations, which includes the landfill and evaporation pond.

- Appendix W, *INEEL CERCLA Disposal Facility Construction Waste Management Plan*, DOE/ID-10958, contains the methods that will be implemented to manage wastes generated during the construction of the ICDF landfill and evaporation pond.

- Appendix X, *INEEL CERCLA Disposal Facility Construction Quality Assurance Plan*, DOE/ID-10851, provides the approach for comprehensive QA during the construction of the ICDF landfill and evaporation pond. The Construction Quality Assurance (CQA) Plan describes the responsibilities and testing requirements for each component of the ICDF landfill and evaporation pond, including, but not limited to, the landfill and evaporation pond liner system, LCS, and evaporation pond.

- Appendix Y, "Technical Specifications for the INEEL CERCLA Disposal Facility," Specification (SPC)-1476, provides the technical specifications for the construction of the ICDF landfill and evaporation pond. The technical specifications include the materials, methods, and workmanship necessary to implement the RD in accordance with the design standards that are contained in this RD/CWP.

- Appendix Z, "INEEL CERCLA Disposal Facility—Drawings," provides the design drawings that have been developed for the construction of the ICDF landfill and evaporation pond. The drawings are listed in Table 1-1 by title and drawing number.

Table 1-1. Engineering drawings for the construction of the ICDF landfill and evaporation pond.

| Title | Drawing Number | Sheet Number |
|---|---|---|
| Title Sheet, Drawing Index, and Site Location Maps | T-201 | 1 |
| Abbreviations, Legend, General Notes | T-202 | 2 |
| General Site/Stockpile Plan | C-201 | 3 |
| Cell 1 Final Grading Plan | C-202 | 4 |
| Evaporation Pond Area Final Grading Plan | C-203 | 5 |
| Grading Sections and Details | C-204 | 6 |
| Grading Sections and Details | C-205 | 7 |
| Cell 1 Geosynthetics Liner Systems Plan | H-201 | 8 |
| Evaporation Ponds Geosynthetics Liner Systems Plan | H-202 | 9 |
| Liner Systems Sections and Details | H-203 | 10 |
| Liner Systems Sections and Details | H-204 | 11 |
| Liner Systems Sections and Details | H-205 | 12 |

Table 1-1. (continued).

| Title | Drawing Number | Sheet Number |
|---|---|---|
| Evaporation Pond Liner Systems Sections and Details | H-206 | 13 |
| Leachate Piping Plan | P-201 | 14 |
| Cell 1 Leak Detection/Leachate Collection Systems Plan | P-202 | 15 |
| Evaporation Ponds Leak Detection/Leachate Piping Systems Plan | P-203 | 16 |
| Leak Detection/Leachate Collection Sections and Details | P-204 | 17 |
| Landfill Crest Pad Building Mechanical Plan | P-205 | 18 |
| Evaporation Pond Crest Pad Building Mechanical Plan | P-206 | 19 |
| Leak Detect./Leachate Collect. Sections and Details | P-207 | 20 |
| Piping Details | P-208 | 21 |
| Leachate Collection System Details | P-209 | 22 |
| Leachate Collection System Details | P-210 | 23 |
| Crest Pad Building Plan and Elevations | A/S-201 | 24 |
| Crest Pad Building Sections and Details | A/S-202 | 25 |
| Truck Loading Plan Sections and Details | A/S-203 | 26 |
| Structural Notes and Details | A/S-204 | 27 |
| Structural Standard Details | A/S-205 | 28 |
| Overall Electrical Site Plan | E-201 | 29 |
| Crest Pad Buildings Electrical Power and Lighting Plans | E-202 | 30 |
| Electrical One-Line Diagrams and MCC Elevations | E-203 | 31 |
| Electrical Control Diagrams | E-204 | 32 |
| Landfill Process and Instrumentation Diagram (P&ID) | IN-201 | 33 |
| Evaporation Pond Process and Instrumentation Diagram (P&ID) | IN-202 | 34 |
| PICS Block Diagram | IN-203 | 35 |
| Crest Pad Buildings Control Pnl Els. | IN-204 | 36 |
| Typical Wiring Diagrams | IN-205 | 37 |
| Erosion Control Plan | EC-201 | 38 |
| Cell 2 Excavation Plan | C-301 | 39 |
| Cell 2 Final Grading Plan | C-302 | 40 |
| Cell 2 Sections and Details | C-303 | 41 |
| Final Cover Plan | C-304 | 42 |
| Cell 1 and 2 Final Cover Sections and Details | C-305 | 43 |
| Cell 2 Geosynthetics Liner System Plan | H-301 | 44 |
| Cell 2 Leachate Collection Plan | P-301 | 45 |
| Cell 2 Leachate Collection Sections and Details | P-302 | 46 |

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- Appendix AA, "Project Schedule and Assumptions," provides the project working schedule for construction of the ICDF landfill and evaporation pond. The schedule identifies the proposed schedule for the ICDF Complex RAWP and indicates the date the ICDF Complex is expected to be operational and begin accepting waste.

- Appendix BB, "Detailed Cost Estimate," provides an estimate of the total projected costs for the ICDF landfill and evaporation pond.

- Appendix CC, "ICDF Technical and Functional Requirements—WAG 3 INEEL CERCLA Disposal Facility," TFR-71, presents the Technical and Functional Requirements (TFRs) that have been developed for the ICDF landfill and evaporation pond. Included in this document is a listing of the ICDF ARARs.

- Appendix DD, "Technical and Functional Requirements for the INEEL CERCLA Disposal Facility Control and Integrated Waste Tracking System," TFR-2520, provides the TFRs for the controls, monitoring, and information systems for the ICDF Complex. The system will incorporate the controls designed and installed for the disposal facility and evaporation ponds, and will interface with one of the control rooms at INTEC. The ICDF Complex will have a variety of conditions that will need continuous monitoring and some degree of control. In addition to control and monitoring, the system will need to archive a variety of conditions such as alarms, levels, and flow totals.

- Appendix EE, "Comment Resolution Forms," will document the comments from the Agencies on the Draft and Draft Final Revisions of the RD/CWP, and will also include the final comment resolutions to address each comment

- Appendix FF, "Permeable Reactive Barrier Evaluation Study," (EDF-ER-273) provides the results of an evaluation of the effectiveness of a permeable reactive barrier for use at the ICDF landfill, based on the results of other studies performed in support of the INEEL CERCLA Disposal Facility Title I Design

- Appendix GG, "Leachate Generation Study," (EDF-ER-269) provides the design calculations and assumptions for modeling of leachate generation within the landfill.

The contents of the Appendix volumes have been changed from the previous ICDF RD/RAWP, submitted in December 2001. Table 1-2 gives the current status of these appendices.

Table 1-2. Changes to ICDF RD/RAWP organization.

| Appendix Title | ICDF RD/CWP Appendix | ICDF RD/RAWP Appendix |
|---|---|---|
| "Leachate/Contaminant Reduction Time Study" (EDF-ER-274) | A | A |
| "Fate and Transport Modeling Results" (EDF-ER-275) | B | B |
| "Liner/Leachate Compatibility Study" (EDF-ER-278) | C | C |
| "Evaluation of Geotechnical Investigations and Calculations Required to Complete Design and Construction" (EDF-ER-276) | D | D |

Table 1-2. (continued).

| Appendix Title | ICDF RD/CWP Appendix | ICDF RD/RAWP Appendix |
|---|---|---|
| "Seismic Evaluation of Landfill and Evaporation Pond"(EDF-ER-282) | E | E |
| "Subsurface Consolidation" (EDF-ER-266) | F | F |
| "Slope Stability Assessments" (EDF-ER-268) | G | G |
| "Landfill Compaction/Subsidence Study" (EDF-ER-267) | H | H |
| "Waste-Soil Design Ratio Calculations" (EDF-ER-277) | I | I |
| "Liner and Final Cover Long-Term Performance Evaluation and Final Cover Life Cycle Expectation" (EDF-ER-281) | J | J |
| "Landfill Leachate Collection System Design Analysis" (EDF-ER-280) | K | K |
| "Evaporation Pond Sizing with Water Balance and Make-up Water Calculations" (EDF-ER-271) | L | L |
| "Hydrologic Modeling of Final Cover" (EDF-ER-279) | M | M |
| "ICDF Technical and Functional Requirements—WAG 3 INEEL CERCLA Disposal Facility" (TFR-71) | CC | N |
| "NESHAP Modeling for the ICDF Complex" (EDF-ER-290) | O | (from 60% design) |
| "Technical and Functional Requirements for the INEEL CERCLA Disposal Facility Control and Integrated Waste Tracking System" (TFR-2520) | DD | O |
| "INEEL CERCLA Disposal Facility Test Pad Construction Report" (EDF-2899) | U | P |
| "Technical Specifications for the INEEL CERCLA Disposal Facility" (Specification [SPC]-1476) | Y | Q |
| "INEEL CERCLA Disposal Facility—Drawings" | Z | R |
| "ICDF Complex Risk Assessment for Workers" (EDF-ER-327) | Not included[a] | S |
| "Screening Level Ecological Risk Assessment" (EDF-ER-311) | R | (from 60% design) |
| "IDAPA Preliminary Air Screening Results" (EDF-ER-315) | N | T |
| "Waste Placement Plan" (EDF-ER-286) | T | U |
| "Storm Water Pollution Prevention Plan for the ICDF Landfill and Evaporation Pond" (Plan [PLN]-962) | V | V |
| Detailed Cost Estimate | BB | W |
| Project Schedule | AA | X |
| Comment Resolution Forms | EE | Y |
| *INEEL CERCLA Disposal Facility Construction Quality Assurance Plan* (DOE/ID-10851) | X | attachment |
| *INEEL Disposal Facility Complex Landfill and Evaporation Pond Operation and Maintenance Plan* (DOE/ID-10852) | Not included[a] | attachment |
| *INEEL CERCLA Disposal Facility Construction Waste Management Plan* (DOE/ID-10958) | W | attachment |

Table 1-2. (continued).

| Appendix Title | ICDF RD/CWP Appendix | ICDF RD/RAWP Appendix |
|---|---|---|
| *Waste Acceptance Criteria for ICDF Landfill* (DOE/ID-10865) | P | attachment |
| *ICDF Complex Groundwater Monitoring Plan* (DOE/ID-10955) | S | attachment |
| *Waste Acceptance Criteria for ICDF Evaporation Pond* (DOE/ID-10866) | Q | attachment |
| "Health and Safety Plan for INEEL CERCLA Disposal Facility Operations," (INEEL/EXT 01-01318) | Not included[a] | attachment |
| "Permeable Reactive Barrier Evaluation Study" (EDF-ER-273) | FF | Not included |
| "Leachate Generation Study" (EDF-ER-269) | GG | Not included |

a. DOE has proposed that these operational documents be included in the ICDF Complex RAWP.

# 2. DESIGN BASIS

## 2.1 General Description of the Project Components

The project components (support facilities, electrical power, and Title III services) are described below.

### 2.1.1 Support Facilities

The location of the support facilities is identified in the design drawings (Appendix Z). Support facilities to be used during construction include construction trailer(s), parking, equipment laydown areas, the permanent stockpile area, and temporary stockpile area(s).

### 2.1.2 Electrical Power

Existing electrical power is available at INTEC. Power will be installed to the SSSTF; power to the ICDF landfill and evaporation pond area will be tied into the SSSTF electrical network.

### 2.1.3 Title III Services

Title III services are included to provide, on an as-needed basis, engineering support during preconstruction, construction, and construction closeout. Construction interface documents (CIDs) and vendor data submittals (VDS) will be reviewed and addressed. During construction, INEEL representative(s) will assist in resolution of technical issues, support inspection of construction workmanship and specification compliance, and evaluate design modifications as needed.

## 2.2 Design Criteria

The purpose of the remedial action is to consolidate INEEL CERCLA wastes into one engineered facility to reduce the footprint of contamination across the INEEL. The OU 3-13 ROD requires the design and construction of the ICDF Complex, which includes the ICDF landfill, evaporation pond, and the SSSTF. Design criteria presented in this RD/CWP are for the ICDF landfill and evaporation pond. The RD/CWP for WAG 3 SSSTF addresses the RD and construction actions for the SSSTF (DOE-ID 2002a). Remedial action and operational issues for the entire ICDF Complex (landfill, evaporation pond, and SSSTF) will be addressed in the ICDF Complex RAWP.

This section describes all elements of the design, construction and operation of the ICDF landfills and evaporation pond. However, operational and management elements are only summarized in this document; they will be described in detail in connection with the SSSTF operation and management in the ICDF Complex RAWP. Primary sources for the ICDF landfill and evaporation pond design criteria are listed below:

- DOE-ID, 1999, *Final Record of Decision, Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13,* DOE/ID-10660, Rev. 0, Department of Energy Idaho Operations Office, Idaho Falls, Idaho, U.S. Environmental Protection Agency Region 10, and State of Idaho Department of Health and Welfare.

- DOE-ID, 2000, *Remedial Design/Remedial Action Scope of Work for Waste Area Group 3, Operable Unit 3-13*, DOE/ID-10721, Rev. 1, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho.

- TFR-71, 2002, "Technical and Functional Requirements - WAG 3 INEEL CERCLA Disposal Facility and Evaporation Pond," Rev. 2, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, May 2002.

- TFR-2520, 2002, "Technical and Functional Requirements for the INEEL CERCLA Disposal Facility (ICDF) Control and Integrated Waste Tracking System," Rev. 0, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, May 2002.

- DOE-ID, 2000b, *Conceptual Design Report for the INEEL CERCLA Disposal Facility and Evaporation Pond,* DOE/ID-10806, Rev. 0, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho.

- 40 CFR 264.301, 1992, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Subpart N, "Landfills," Section 301, "Design and operating requirements," *Code of Federal Regulations*, Office of the Federal Register, January 1, 1992.

- 40 CFR 761.75, 1999, "Polychlorinated Biphenyls (PCBs) Processing, Distribution in Commerce and Use Prohibitions," Section 75, "Chemical waste landfills," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

- DOE O 435.1, "Radioactive Waste Management," U.S. Department of Energy, August 28, 2001.

The following subsections detail the specific design criteria for the ICDF landfill and evaporation pond.

### 2.2.1 ICDF Landfill and Evaporation Pond System

The ICDF landfill will be designed and operated to meet the substantive requirements of DOE Order 435.1 for radioactive waste landfill design and operating requirements. Additionally, the ICDF landfill will be engineered to meet IDAPA 58.01.05.008 (40 CFR 264.301) hazardous waste and 40 CFR 761.75 PCB design and operating substantive requirements. The ICDF landfill and evaporation pond will be designed such that cumulative carcinogenic risk from all pathways is less than or equal to $1 \times 10^{-4}$. The ICDF landfill will meet or exceed RCRA Subtitle C design standards and the PCB Chemical Waste Landfill design requirements. The ICDF landfill and evaporation pond design will be protective of human and ecological receptors. The ICDF Complex will accept only INEEL on-Site CERCLA wastes meeting the ICDF WACs (DOE-ID 2002b, DOE-ID 2002c, and DOE-ID 2002d).

### 2.2.2 Siting

The ICDF landfill will be located in an area meeting hazardous waste, PCB waste, and low-level waste landfill siting requirements. The ICDF landfill will meet or exceed the substantive RCRA Subtitle C location standards. Additional specific siting criteria for the location of the ICDF landfill included the following:

- Outside the 100-year flood plain

- Within the WAG 3 AOC

- Outside of wetland areas

- Not in active seismic zones

- Not in high surface erosion zones
- Not in an area of high historic groundwater table.

### 2.2.3 Landfill

The landfill will be designed to be protective of the SRPA, such that groundwater does not exceed a cumulative carcinogenic risk of $1 \times 10^{-4}$, a total HI of 1, or applicable State of Idaho groundwater quality standards (e.g., maximum contaminant levels [MCL]). The ICDF landfill will be closed and capped to prevent exposure of the public to a cumulative carcinogenic risk of $1 \times 10^{-4}$ and a total HI of 1. The ICDF landfill will have a total capacity of approximately 390,000 $m^3$ (510,000 $yd^3$), and will be designed for an operational life of 15 years, a post-closure period of 30 years, and an expected cap design life of 1,000 years. Additional ICDF landfill design requirements are as follows:

- Minimize precipitation run-on and maximize precipitation run-off to effectively reduce infiltration through the contaminated soils and debris
- Minimize subsidence of the waste and the landfill cap
- Ensure that the resulting design is protective of human and ecological receptors
- Ensure that the resulting design is protective of the SRPA.

***2.2.3.1 RCRA Subtitle C Landfill Design Criteria.*** The ICDF landfill will be engineered to meet the substantive RCRA Subtitle C landfill design requirements, which are identified in 40 CFR 264.301. The technical design requirements include requirements for the liner system and leachate collection and removal system. The liner system must include the following:

- A top liner designed and constructed of materials (e.g., a geomembrane) to prevent the migration of hazardous constituents into such liner during the active life and post-closure care period.
- A composite bottom liner, consisting of at least two components. The upper component must be designed and constructed of materials (e.g., a geomembrane) to prevent the migration of hazardous constituents into this component during the active life and post-closure care period. The lower component must be designed and constructed of materials to minimize the migration of hazardous constituents if a breach in the upper component were to occur. The lower component must be constructed of at least 3 ft (91 cm) of compacted soil material with a hydraulic conductivity of no more than $1 \times 10^{-7}$ cm/sec.

The leachate collection and removal system immediately above the top liner must be designed, constructed, operated, and maintained to collect and remove leachate from the landfill during the active life and post-closure care period. The leachate collection and removal system between the liners, and immediately above the bottom composite liner in the case of multiple leachate collection and removal systems, is also a leak detection system. This leak detection system must be capable of detecting, collecting, and removing leaks of hazardous constituents at the earliest practicable time through all areas of the top liner likely to be exposed to waste or leachate during the active life and post-closure care period. The requirements for a leak detection system are satisfied by installation of a system that is, at a minimum:

- Constructed with a bottom slope of 1% or more.

- Constructed of granular drainage materials with a hydraulic conductivity of $1 \times 10^{-2}$ cm/sec or more and a thickness of 12 in. (30.5 cm) or more; or constructed of synthetic or geonet drainage materials with a transmissivity of $3 \times 10^{-5}$ $m^2$/sec or more.

- Constructed of materials that are chemically resistant to the waste managed in the landfill and the leachate expected to be generated, and of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes, waste cover materials, and equipment used at the landfill.

- Designed and operated to minimize clogging during the active life and post-closure care period.

- Constructed with sumps and liquid removal methods (e.g., pumps) of sufficient size to collect and remove liquids from the sump and prevent liquids from backing up into the drainage layer. Each unit must have its own sump(s). The design of each sump and removal system must provide a method for measuring and recording the volume of liquids present in the sump and of liquids removed.

The owner or operator shall collect and remove pumpable liquids in the leak detection system sumps to minimize the head on the bottom liner. The owner or operator of a leak detection system that is not located completely above the seasonal high water table must demonstrate that the operation of the leak detection system will not be adversely affected by the presence of groundwater.

***2.2.3.2 PCB Landfill Design Criteria.*** Technical Requirements for chemical waste landfills used for the disposal of PCBs and PCB items are established in 40 CFR 761.75. The landfill site shall be located in thick, relatively impermeable formations such as large-area clay pans. Where this is not possible, the soil shall have a high clay and silt content with the following parameters:

- In-place soil thickness of 4 ft, or compacted soil liner thickness of 3 ft

- Permeability (cm/sec), equal to or less than $1 \times 10^{-7}$

- Percent soil passing No. 200 Sieve, > 30

- Liquid Limit > 30

- Plasticity Index > 15.

Synthetic membrane liners shall be used when the hydrologic or geologic conditions at the landfill require such a liner in order to provide at least a permeability equivalent to the soils listed in the bullets above. Whenever a synthetic liner is used at a landfill site, special precautions shall be taken to ensure that its integrity is maintained and that it is chemically compatible with PCBs. Adequate soil underlining and soil cover shall be provided to prevent excessive stress on the liner and to prevent rupture of the liner. The liner must have a minimum thickness of 30 mils.

Several operational requirements are also contained in 40 CFR 761.75 that are applicable to the operations of the ICDF landfill. As this section provides design criteria, operational requirements are not addressed.

### 2.2.4 Evaporation Pond

The evaporation pond will consist of two individual cells. The evaporation pond will be designated and constructed as a CAMU in accordance with the substantive requirements of IDAPA 58.01.05.08 (40 CFR 264.552 and 40 CFR 264 Subpart K and CC).

### 2.2.5 Leachate Collection System

The leachate system will utilize a primary and secondary liner system with leachate collection and detection systems.

The pumps for the LCS will be accessible for maintenance or replacement.

Several design requirements for the leachate detection system are contained in Section 2.2.3.1, "RCRA Subtitle C Landfill Design Criteria" (40 CFR 264.301). The same LCS requirements apply to the landfill and the evaporation pond.

### 2.2.6 Landfill Cover

The ICDF landfill closure and post-closure will minimize subsidence of the landfill and its final cover. The cap will be designed to minimize infiltration and run-on and maximize run-off. Minimization of precipitation run-on will effectively reduce infiltration through the contaminated soils and debris. The cover will be designed to protect against inadvertent intrusion for a period of 1,000 years. The final cover will be designed to withstand erosion from a 500-year flood event, as described in EDF-ER-281. The ICDF operations and Waste Placement Plans (WPPs) will be prepared to minimize subsidence of the waste and the landfill cap.

### 2.2.7 Boundaries and Interfaces

All ICDF Complex activities will take place within the WAG 3 AOC per Figure 1-10 of the OU 3-13 ROD (DOE-ID 1999).

Permanent markers that identify the potential exposure hazards will be installed at all corner boundaries for each cell of the landfill. Land use restrictions, institutional controls, and deed restrictions will be placed on the ICDF landfill and evaporation pond and its adjacent buffer zone to permanently preclude development until unacceptable risk no longer remains at the site.

During the operational phase, a 6-ft woven mesh fence, wall, or similar device will be placed around the site to prevent animals and unauthorized persons from entering. The fence may not be necessary for closure and post-closure.

### 2.2.8 Operations

The ICDF landfill will be designed to routinely perform waste placement in yearly campaigns that run from March to November, whenever waste conditions are amenable for waste placement. However, the facility will remain in operation the remainder of the year. The ICDF landfill and evaporation pond will be designed to allow operating on a 10-hour shift, four days per week. Void spaces between waste material disposed in the landfill will be filled to minimize future subsidence. The ICDF landfill operations will include the disposal records and the surveyed permanent marker locations in the land use restriction documents. Additional operating requirements include the following:

- Limit disposed wastes to the ICDF landfill and evaporation pond to waste that is acceptable under the ICDF landfill WAC (DOE-ID, 2002b) and the ICDF evaporation pond WAC (DOE-ID, 2002c).

- Limit disposed wastes to the ICDF landfill and evaporation pond to those with contaminant concentrations that will not result in MCL being exceeded in the SRPA.

- Limit disposed wastes to the ICDF landfill to low-level radioactive waste, PCB solids, hazardous, and mixed low-level radioactive waste.

- Treat waste (soils, debris, and treatment residues) on-Site as necessary to meet the landfill WAC (DOE-ID 2002b) prior to disposal.

- Treat waste (soils, debris, and treatment residues) originating from outside the WAG 3 AOC to comply with the land disposal requirements specified in IDAPA 58.01.05.011 (40 CFR 268 and 40 CFR 268.49) as applicable. Those WAG 3 wastes that have triggered placement must also meet this requirement.

- Minimize leachate generation from the ICDF landfill.

### 2.2.9 Health and Safety

The ICDF Complex will be designed to provide health and safety protection in accordance with 29 CFR 1910, "Occupational Safety and Health Standards." Support buildings within the ICDF Complex will also be designed in accordance with the National Fire Protection Association (NFPA) 101 "Life Safety Code," and the Uniform Building Code (UBC 1997).

### 2.2.10 Waste Management

Only INEEL on-Site CERCLA wastes meeting the ICDF landfill or evaporation pond WAC (DOE-ID 2002b; DOE-ID 2002c) will be disposed in the ICDF landfill or evaporation pond. Wastes will be limited to low-level radioactive, PCB solids, hazardous, and mixed low-level waste. Hazardous substances disposed in the ICDF landfill will not result in exceeding groundwater quality standards in the underlying groundwater aquifer, even if the ICDF landfill LCS were to fail after closure.

### 2.2.11 Operating Environment and Natural Phenomena

With respect to natural phenomena hazards (seismic, wind, and flood), the ICDF landfill and evaporation pond will be categorized as Performance Category (PC)-1, as defined by DOE-STD-1020 and 1021. Seismic design will be performed using UBC procedures.

### 2.2.12 Civil, Architectural, and Structural

A 100-m (328-ft) buffer zone will be maintained as part of the exclusion area around the capped area. Surface drainage will be diverted away from the ICDF landfill and evaporation pond. Excavation of rock should not be included as part of the design, as borings have identified the depth to bedrock as approximately 10.7 to 16.5 m (35 to 54 ft) deep (DOE-ID 2000b). The landfill and evaporation pond excavations will supply necessary fill material. Disturbed areas adjacent to the ICDF site and any stockpiles will be revegetated to prevent erosion and provide sediment and dust control.

The crest pad buildings, which will provide an enclosed area protected from the elements for sampling and maintaining leachate pumps, will be designed and constructed in accordance with the UBC.

The facility will be an insulated, engineered metal building system classified as Type II-N construction with metal wall panels and a standing seam metal roof. The crest pad buildings will be designed for dead, live, snow, and wind loads in accordance with American Society of Civil Engineers (ASCE) 7-95 and the DOE-ID standards (DOE-ID 2000d).

Reinforced, cast-in-place concrete foundations will be provided for the crest pad buildings consisting of spread footings, column piers, grade beams, and a slab-on-grade floor.

### 2.2.13 Mechanical

The crest pad buildings will have radiant-type unit heaters for freeze protection and personnel comfort during leachate sampling operations.

### 2.2.14 Fire Protection

The ICDF landfill and evaporation pond will be provided an underground fire main by connecting to the SSSTF utility fire supply line. The ICDF landfill and evaporation pond will have fire hydrants placed for easy access and adequate fire hose lay down. Fire extinguishers will be provided in each crest pad building. The ICDF landfill and evaporation pond crest pad buildings will be equipped with fire alarm, voice paging, and evacuation systems.

### 2.2.15 Electrical

The ICDF landfill and evaporation pond area will be equipped with electrical power capabilities. The utilities for the ICDF landfill and evaporation pond area will be supplied by tie-in to the SSSTF utilities. Power for the ICDF landfill and evaporation pond crest pad buildings will be supplied from the SSSTF substations via underground duct bank.

The ICDF landfill and evaporation pond areas will be provided with a ground system. Any metal underground piping systems, the rebar in the foundation, and the metal frame of the crest pad buildings will be tied to the ground system.

Lighting will meet the recommendations of the current Illumination Engineering Society. Nonglare fluorescent fixtures will supply light in the crest pad buildings. Metal halide fixtures mounted on poles will provide exterior area lighting.

### 2.2.16 Closure

The ICDF landfill closure and post-closure will meet or exceed substantive RCRA Subtitle C closure and post-closure requirements, in accordance with substantive requirements of IDAPA 58.01.05.008 (40 CFR 264.310[a][1][2][3][4][5] and 40 CFR 264.310[b][1][4][5][6]). The ICDF landfill will be capped and the evaporation pond will be either clean closed or capped. Site access restrictions and institutional controls will be maintained throughout the post-closure period. Closure requirements will include the following:

- Access restrictions to prevent intrusions into the closed area, including the creation of a buffer zone surrounding the capped ICDF landfill and supporting structures.

- Access controls, monitoring, and maintenance will remain in place for as long as the contents of the landfill remain a threat to human health or the environment if uncontrolled.

- Meet the substantive requirements of RCRA Subtitle C closure and post closure care requirements specified in IDAPA 58.01.05.008 (40 CFR 264.310[a][1][2][3][4][5] and 40 CFR 264.310[b][1][4][5][6]).

- Ensure that the final cover is designed to serve as an intrusion barrier for a period of at least 1,000 years.

- Minimize subsidence of the landfill and its final cover.

- Place easily located permanent markers at all corner boundaries for each cell of the landfill that identify the potential exposure hazards.

- Place permanent land use restrictions, zoning restrictions, and deed restrictions on the ICDF landfill and evaporation pond and its adjacent buffer zone to permanently preclude industrial or residential development until unacceptable risk no longer remains at the site.

- Include the disposal records and surveyed permanent marker locations in the land use restriction documents.

Closure strategies will be described in detail in the ICDF Complex RAWP to be submitted in the summer of 2002. They are also explained in Section 5.14 of this RD/CWP.

## 2.3 DOE Related Codes, Standards, and Documents

The following national standards, codes, and regulations, subtier standards, code and regulations and site-specific documents are used as the design and operating basis for the ICDF landfill and evaporation pond:

- 10 CFR 830.120, 1999, "Nuclear Safety Management," Section 120, "Quality assurance requirements," *Code of Federal Regulations*, Office of the Federal Register, January 1, 1999.

- 10 CFR 835, 1999, "Occupational Radiation Protection," *Code of Federal Regulations*, Office of the Federal Register, January 1, 1999.

- 29 CFR 1910.120, 1998, "Occupational Safety and Health Standards," Section 120, "Hazardous waste operations and emergency response," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1998.

- 29 CFR 1926.65, 1999, "Safety and Health Regulations for Construction," Section 65, "Hazardous waste operations and emergency response," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.

- ASME NQA-1, 1997, "Quality Assurance Requirements for Nuclear Facility Applications," American Society for Mechanical Engineers.

- DOE-ID, 1991, *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory*, U.S. Department of Energy Idaho Operations Office, U.S. Environmental Protection Agency Region 10, State of Idaho Department of Health and Welfare.

- DOE-ID, 1999, *Final Record of Decision, Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13,* DOE/ID-10660, Rev. 0, Department of Energy Idaho Operations Office, Idaho Falls, Idaho, U.S. Environmental Protection Agency Region 10, and State of Idaho Department of Health and Welfare.

- DOE-ID, 2000b, *Conceptual Design Report for the INEEL CERCLA Disposal Facility and Evaporation Pond,* DOE/ID-10806, Rev. 0, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho.

- DOE O 232.1, "Environmental, Safety, and Health Reporting," U.S. Department of Energy, September 30, 1995.

- DOE O 232.1A, "Occurrence Reporting and Processing of Operating Information," U.S. Department of Energy, August 1, 1997.

- DOE O 414.1, "Quality Assurance," U.S. Department of Energy, November 24, 1998.

- DOE O 420.1, "Facility Safety," U.S. Department of Energy, November 22, 2000.

- DOE O 435.1, "Radioactive Waste Management," U.S. Department of Energy, August 28, 2001.

- DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees," U.S. Department of Energy, March 27, 1998.

- DOE O 470.1, "Safeguards and Security Programs," U.S. Department of Energy, September 28, 1995.

- DOE O 5400.5, "Radiation Protection of the Public and the Environment," U.S. Department of Energy, January 7, 1993.

- DOE O 5480.4, "Environmental Protection, Safety, and Health Protection Standards," U.S. Department of Energy, January 7, 1993.

- EPA, 2000, *Requirements for Quality Assurance Project Plans*, EPA QA/R-5, U.S. Environmental Protection Agency.

- TFR-71, 2002, "Technical and Functional Requirements - WAG 3 INEEL CERCLA Disposal Facility and Evaporation Pond," Rev. 2, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, May 2002.

- TFR-2520, 2002, "Technical and Functional Requirements for the INEEL CERCLA Disposal Facility (ICDF) Control and Integrated Waste Tracking System," Rev. 0, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, May 2002.

## 2.4 Engineering Standards

The following engineering standards are applicable to the ICDF landfill and evaporation pond design. In addition, Appendix Y provides the technical specifications for the ICDF landfill and evaporation pond construction. These specifications identify additional applicable testing and standard specifications. Relevant engineering standards that were key in the design process include the following:

- DOE-ID, 2000d, *Architectural Engineering Standards*, Rev. 27, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho.

- ITD, 1999, "Standard Specifications for Highway Construction," State of Idaho Transportation Department, Division of Highways, 1999.

- UBC, 1997, "Uniform Building Code," International Conference of Building Officials, April 1997.

- ASCE 7-95, "Minimum Design Loads for Buildings and Other Structures," American Society of Civil Engineers.

- AASHTO, "Geotextile Specification for Highway Applications," M-288, American Association of State Highway and Transportation Officials, latest edition.

- NFPA 70, 2001,"National Electrical Code," National Fire Protection Association, August 2, 2001.

- NFPA 101, 2000, "Life Safety Code," National Fire Protection Association, February 2000.

- NFPA 780, 2000, "Standard for Installation of Lightning Protection Systems," National Fire Protection Association, February 2000.

## 2.5 Environmental and Safety Requirements

The ROD outlines ARARs for the design, construction, operation, and post-closure of the ICDF landfill and evaporation pond. Action-specific ARARs address all aspects of ICDF landfill and evaporation pond operation. Chemical-specific ARARs primarily identify the methods for characterizing hazardous wastes and managing hazardous waste-contaminated soils. Action-specific requirements for PCB landfills and other design strategies are included in the ARARs. Location-specific ARARs are applicable for the ICDF landfill and evaporation pond, although it is anticipated that no special requirements will be triggered because the area is sited in a previously undisturbed area, and has been surveyed for archeological and cultural resources and received the appropriate clearances. Section 4 of this RD/CWP further addresses the ICDF landfill and evaporation pond ARARs. Table 3.1.4-1 in TFR-71 (Appendix CC) outlines the ARAR compliance strategy for the ICDF landfill and evaporation pond.

The ARARs also outline safety requirements as identified in DOE Orders 435.1 and 5400.5. Additional health and safety requirements are identified in the ICDF Health and Safety documents (INEEL 2002a and b).

## 2.6 Internal Procedures

Titles I, II, and III design activities are performed in compliance with the applicable INEEL internal procedures. The applicable internal procedures for this project are those identifying requirements in the following areas:

- Engineering design

- Emergency preparedness and management

- Environmental management

- Fire protection
- Management systems
- Occupational safety and health
- Radiological protection
- Security
- Environmental restoration
- Waste management
- Conduct of maintenance/conduct of operations
- Quality.

## 2.7 General Design Assumptions

The design assumptions for the ICDF landfill and evaporation pond were identified in the RD/RA SOW (DOE-ID 2000a), and in the development of the project technical and functional requirements (TFR-71). Relevant design assumptions are as follows:

- The ICDF Complex will be located within the WAG 3 AOC.
- Waste placement at the ICDF landfill will occur 10 hours per day and four days per week.
- The ICDF landfill and evaporation pond administrative area will be combined with the SSSTF administrative area.
- Independently generated centralized stand-by power will not be required.
- ICDF landfill and evaporation pond area utility connections will be via SSSTF utility connections.
- The ICDF landfill will routinely perform waste placement in yearly campaigns that begin in March and end in November; however, the facility will be operational the remainder of the year. Waste monitoring and management operations will be required year-round.
- An operational period of 15 years was assumed for the ICDF landfill, followed by a 30-year post-closure period.
- Groundwater monitoring will be conducted in accordance with the groundwater monitoring plan (DOE-ID 2002e).
- Completion of the ICDF landfill and evaporation pond and approval to begin operations will occur prior to the start of Group 3 soil removal actions at OU 3-13.
- The specific gravity for soil is 2.65.

- The average annual rainfall at the site was assumed to be approximately 8 in./year (NOAA 1989).

- The ICDF landfill and evaporation pond will be designed for a design basis earthquake that is equivalent to an earthquake event with a return period of 10,000 years.

- Site access restrictions and institutional controls will be maintained throughout the post-closure period.

## 2.8 Specific Design Assumptions

In addition to the general ICDF landfill and evaporation pond assumptions from the RD/RA SOW and TFR-71 outlined above, design-component specific design assumptions, identified in the following subsections, were also addressed.

### 2.8.1 Leachate Collection System

- The LCS will operate to prevent backup into the waste layer and maintain leachate at allowable levels.

### 2.8.2 ICDF Landfill

- A clay liner will be designed and constructed under 100% of the landfill area.

- Gas vents in the landfill will not be required, as significant quantities of organic wastes will not be disposed in the ICDF landfill.

- The ICDF landfill will consist of two separate waste disposal cells, with the second cell constructed after waste placement has begun in the first cell, based on the expected waste placement schedule in the first cell.

- The calculated recharge rate for the final cover is zero net recharge to the landfill. A recharge rate, calculated in EDF-ER-279, has been selected as the maximum design recharge rate.

### 2.8.3 ICDF Evaporation Pond

- For the purpose of evaporation pond sizing, active storage in the evaporation pond will be required to handle up to three years in a row of maximum leachate production. These would be concurrent with the worst-case precipitation years.

- Leachate will not contain constituents such as scum or oil that could further lower evaporative rates.

### 2.8.4 Waste Acceptance and Waste Management

- Waste exceeding 10 nCi/g transuranic (TRU) constituents will not be disposed to the ICDF landfill.

- A WAC will be developed establishing requirements for the ICDF landfill disposal cells; the landfill WAC is included as Appendix P to this RD/CWP.

- A WAC will be developed for the evaporation pond; the evaporation pond WAC is included Appendix Q to this RD/CWP.

- Bulk waste material will go through an administrative and validation process at the ICDF Complex that includes weighing, profiling, verification, acceptance, QA, and database management before the material will proceed to the ICDF landfill and evaporation pond.

- Waste originating outside the WAG 3 AOC will be treated to comply with the land disposal requirements in IDAPA 58.01.05.11 (40 CFR 268 and 40 CFR 268.49). Certain wastes within the WAG 3 AOC will also need treatment, as required by the ROD (DOE-ID 1999).

- Waste exceeding specified sizes in the WAC may be accepted by exception, but will require special procedures and authorizations.

- Steel boxes of waste disposed in the landfill are assumed to be completely filled and, therefore, incompressible.

- Waste arriving at the ICDF Complex will be limited to one waste profile per container.

- Waste generators will provide an approved waste profile for each waste stream prior to shipping the waste to the ICDF Complex.

- Waste will meet the ICDF Complex WACs (DOE-ID 2002b, DOE-ID 2002c, and DOE-ID 2002d).

- The wastes managed in the pond will be mixed wastes, and are therefore eligible for a 40 CFR 264 Appendix CC exemption for CERCLA waste streams.

- The ICDF Complex will be considered an "on-Site" facility for the purpose of INEEL CERCLA waste disposal.

- No debris will be placed in the 5 ft of wastes immediately above the operations layer, in the 5 ft of wastes below the final waste elevation, and in the 50 ft of wastes adjacent to the sides of the landfill.

- Disposal of debris has been based on spreading debris out to allow complete soil coverage and thus rely on proper compaction of soil for supporting cap and not on strength of debris.

- Wooden boxes will be collapsed during landfill operations.

- Building debris was assumed to be in pieces that could be placed flat in the landfill and not a tangled mass that would be compressible as additional fill is placed.

- Compaction of debris, except for drums, will be performed with a vibratory compactor and not small, hand-operated equipment.

## 2.9 Quality Assurance

Two QA plans have been developed to evaluate the construction of the ICDF landfill and evaporation pond, based on the design requirements. The *INEEL CERCLA Disposal Facility Construction Quality Assurance Plan for Excavation and Constructing and Testing of Clay Liner and Test Pad* (DOE-ID 2001d) was developed to ensure construction quality during the early excavation and test pad construction, conducted during calendar year 2001. *The INEEL CERCLA Disposal Facility Construction Quality Assurance Plan* (DOE-ID 2002f), provided as an attachment to this RD/CWP, was developed to

ensure the remaining ICDF landfill and evaporation pond construction activities are conducted in accordance with the design.

The current facilities and systems planned for the ICDF landfill and evaporation pond are identified as "low safety consequence." Consequently, the ICDF landfill and evaporation pond have been given a "Quality Level 3" designation.

In the development of the ICDF Construction Quality Assurance Plan, the following quality-assurance related codes were evaluated, and are applicable to the design of the ICDF landfill and evaporation pond as best management practices:

- EPA, 1995, *Quality Assurance and Quality Control for Waste Containment Facilities*, EPA/600/SR-93/182, U.S. Environmental Protection Agency.

- EPA, 2000, *Requirements for Quality Assurance Project Plans*, EPA QA/R-5, U.S. Environmental Protection Agency.

- 10 CFR 830.120, 1999, "Nuclear Safety Management," Section 120, "Quality assurance requirements," *Code of Federal Regulations*, Office of the Federal Register, January 1, 1999.

- ASME NQA-1, 1997, "Quality Assurance Requirements for Nuclear Facility Applications," American Society for Mechanical Engineers.

- DOE O 414.1, "Quality Assurance," U.S. Department of Energy, November 24, 1998.

Additionally, an ICDF Complex Quality Program Plan (QPP) (PLN-873) has been developed that will govern the QA program for the ICDF Complex. The ICDF Complex QPP establishes QA requirements for the SSSTF, landfill, and evaporation pond. The QPP encompasses all activities during the completion of the design, construction, and initial operation testing. The QPP may be revised in the future, depending up an evaluation of the document before the start of continuous ICDF Complex operations.

# 3. REMEDIAL DESIGN

This section describes the RD for the ICDF landfill and evaporation pond, which was developed in accordance with the design basis presented in Section 2 of this RD/CWP. The specifications and technical and design drawings are presented in Appendices Q and R, respectively. The RD of the components of the ICDF landfill and evaporation pond are described in the following subsections.

## 3.1 Project Site

The site selected for the construction of the ICDF landfill and evaporation pond, shown previously in Figure 1-2, is shown in detail in the design drawings Appendix Z. The site selection was based on several siting criteria, documented in Section 2 of this RD/CWP. The selected site was presented in the ICDF CDR (DOE-ID 2000b), which utilized geotechnical information presented in the ICDF Geotechnical Report for the CDR (DOE-ID 2000c) for final siting selection. Figure 3-1 depicts the general results of the geotechnical investigation. The north boundary of the ICDF landfill forms the south boundary of the SSSTF. The overall site orientation will facilitate the expansion of the ICDF landfill (Cell 2), as it becomes necessary. The site selection also effectively joins SSSTF and ICDF landfill and evaporation pond operations through adjacent siting.

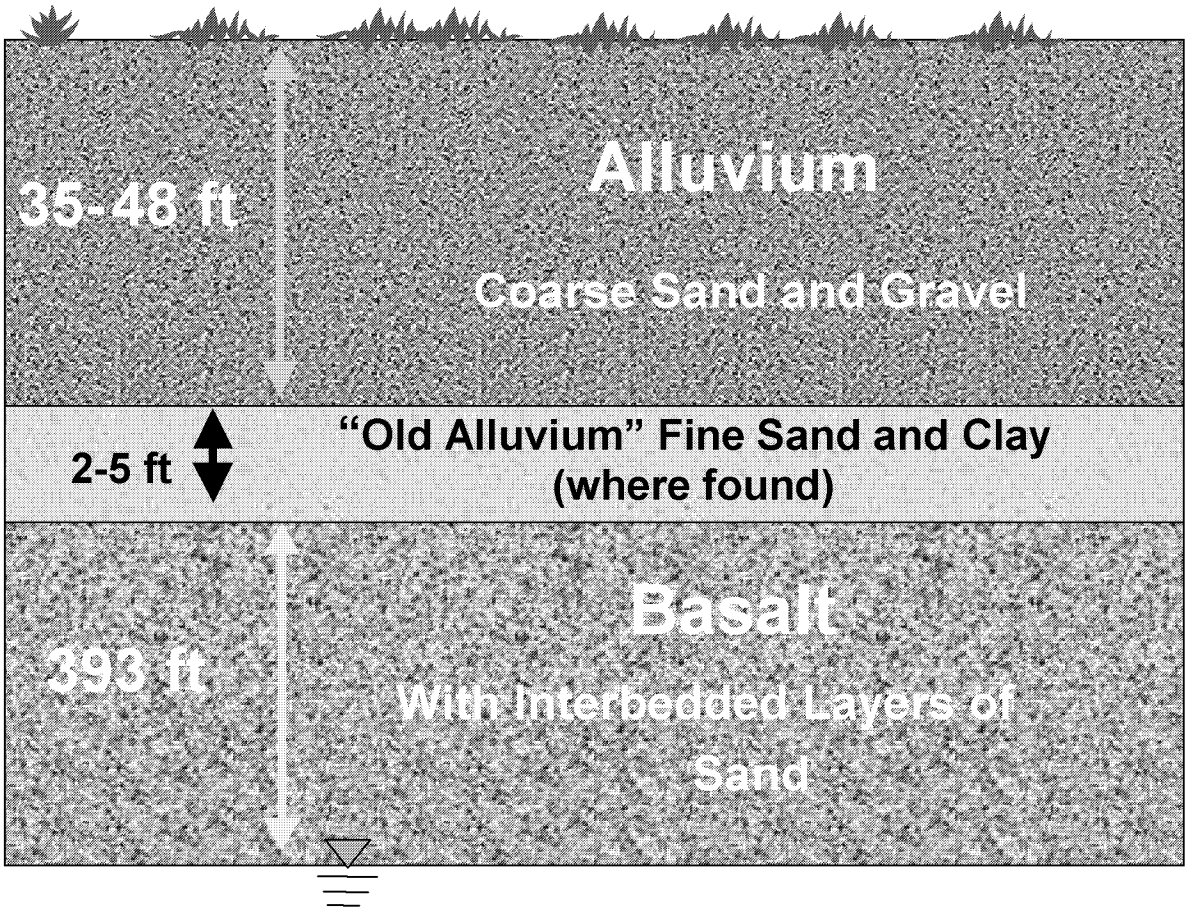


Figure 3-1. Generalized lithology of the ICDF landfill site.

## 3.2 Physical Site Description

The site selected for the ICDF Complex (shown in Figure 1-2 and the design drawings) is adjacent to Lincoln Boulevard and situated at the southwest corner of the INTEC facility, outside the facility fence. The SSSTF is the northernmost Complex component, directly to the west of the INTEC facility fence. To the south of the SSSTF is the ICDF landfill, which is composed of two cells. Cell 1, the northernmost cell, will be constructed first. Cell 2 is immediately adjacent to Cell 1, to the south, and will be constructed when Cell 1 nears or has reached capacity. To the east of the landfill is the evaporation pond, which is also composed of two cells, referred to as the east and west ponds. The evaporation pond is directly south of the INTEC facility fence, and also sits just west of the existing INTEC percolation ponds. Two crest pad buildings will be constructed to provide shelter to leachate transfer equipment and personnel that will conduct leachate sampling. One crest pad building, located on the northern side of the landfill, will be for the landfill; the other, located on the northern side of the evaporation pond, will be for the evaporation pond. Fencing will be maintained around the ICDF Complex to provide security for the components and control of the waste handling practices that take place. The proximity of the ICDF Complex to the INTEC facility allows for utilities to be extended to serve the SSSTF and the ICDF landfill and evaporation pond.

The location of the ICDF Complex allows for easy access from Lincoln Boulevard, the main INEEL road between facilities. This will allow controlled yet straightforward access to the ICDF Complex components, as needed, for WAG waste management.

During the 2001 field season, several ICDF construction activities were performed as part of the Early Excavation and Test Pad effort, which was conducted in accordance with the AFC design documentation, part of the Excavation and Test Pad Master Table of Documents (DOE-ID 2001b). The following activities were performed that have altered the physical site description, in preparation for the ICDF landfill and evaporation pond construction:

- Cleared and grubbed Rye Grass Flats, the location for the permanent stockpile, and the landfill and evaporation pond sites.
- Constructed a new haul road to Rye Grass Flats.
- Performed subgrade preparation for the evaporation pond.
- Constructed a preliminary test pad at Rye Grass Flats to determine what equipment types meet compaction requirements.
- Constructed a test pad near the ICDF landfill to determine what equipment types meet compaction requirements. The test pad construction included lift placement, compaction, and testing of the lifts.
- Constructed the embankments for the ICDF evaporation pond and constructed the two evaporation pond cells.
- Excavated the ICDF landfill Cell 1.
- Installed site perimeter fencing.
- Revegetated disturbed areas.

The Early Excavation and Test Pad construction work prepared the site for subsequent ICDF landfill and evaporation pond construction activities that will begin in 2002.

## 3.3 Design Calculations/Studies

In addition to the project specifications and design drawings contained in Appendices Y and Z, respectively, another significant element of the design are the design analyses that have been performed to support this RD/CWP. Appendix Volumes 1 through 3 contain the ICDF landfill and evaporation pond design analyses that have been prepared to support the Title II design. A summary of the design analyses is presented in Section 1.4 of this RD/CWP. Additionally, several other design calculations and studies have been previously finalized at earlier stages of Title II design work. These design elements, in the form of EDFs, are described in Section 1.3. The design analyses provide the technical support for the design presented in this RD/CWP. Specific elements of the design reference individual design analyses, as appropriate.

## 3.4 Site Preparation

The areas directly associated with the ICDF landfill and evaporation pond construction will be cleared of vegetation in accordance with Specification 02200, "Site Preparation" (SPC-1476). Most of the site clearing will be performed as part of the early excavation and test pad construction, completed during calendar year 2001.

## 3.5 Construction Staging

A laydown area and stockpile area will be necessary at the ICDF landfill and evaporation pond site to stage equipment and materials close to the work. The staging areas will be located so the noncontaminated materials and equipment operate in the work areas isolated from contaminated materials and equipment. Areas identified for staging are provided in the design drawings (Appendix Z).

## 3.6 Earthwork

All earthwork at the ICDF landfill and evaporation pond involving excavation and placement of fill materials will be graded to slope away from both the landfill and evaporation pond, to encourage drainage away from the excavations during construction, and from the disposal cells and evaporation pond during operations. Earthwork for the landfill, evaporation pond, and borrow areas will be conducted in accordance with Specifications 02315, "Fill and Backfill," 02316, "Excavation," 02317, and "Borrow Area Excavation" (SPC-1476).

All areas that are disturbed by earthwork activities during construction will be revegetated in accordance with Specification 02920, "Reclamation and Revegetation" (SPC-1476). Seed mixtures, application rates, fertilizers, and application dates specified are designed to provide INEEL native species for the revegetation, and are placed at optimum time with the necessary materials.

Standard dust control measures have been included in the design. The use of water and stopping work during periods of high winds will all be employed during construction.

Some elements of the earthwork design were finalized in the Early Excavation and Test Pad AFC design documents. Elements of the earthwork have been completed during calendar year 2001.

### 3.6.1 ICDF Landfill

Earthwork at the ICDF landfill consists of the excavation of each of the cells, as shown in the design drawings (Appendix Z). The design for both cells is presented in this RD/CWP; however, construction of the cells will follow a phased approach. Cell 1 will be constructed first, and Cell 2 will be constructed as Cell 1 nears or reaches capacity, or when other project considerations indicate construction should be initiated. Final grading surrounding the landfill will be completed according to the drawings (Appendix Z). Revegetation will be in accordance with Specification 02920 (SPC-1476).

### 3.6.2 Leachate Collection System

Earthwork for the LCS consists of excavating the trenches and sumps necessary for the LCS, as shown in the design drawings (Appendix Z). Disturbed areas will be revegetated in accordance with Specification 02920 (SPC-1476).

### 3.6.3 ICDF Evaporation Pond

Earthwork at the ICDF evaporation pond consists of the excavation of each of the evaporation pond cells, as shown in the design drawings (Appendix Z). Final grading surrounding the evaporation pond will be completed according to the drawings (Appendix Z). Revegetation will be completed in accordance with Specification 02920 (SPC-1476).

### 3.6.4 ICDF Crest Pad Building

Earthwork for the crest pad buildings consists of excavation and grading necessary for placement of the buildings' foundations. Earth surrounding the crest pad buildings will be sloped away from the crest pad buildings, and the crest pads will be placed at the highest finish elevation surrounding the landfill or evaporation pond, respectively.

### 3.6.5 Final Cover

Earthwork for the final ICDF landfill cover will involve the placement of geologic materials and geomembranes, as shown in the design drawings (Appendix Z). Exact material specifications and design for the final cover are presented in the design drawings (Appendix Z) and design specifications (SPC-1476). More detailed design information for the final cover is presented in Section 3.12 of this RD/CWP.

## 3.7 Landfill

The ICDF landfill is designed, and will be operated, to meet the substantive requirements of DOE Order 435.1 for radioactive waste landfill design and operating requirements. The landfill is engineered to meet substantive requirements of IDAPA 58.01.05.008 (40 CFR 264.301) hazardous waste, also referred to as RCRA Subtitle C, and 40 CFR 761.75, PCB landfill design. Technical elements necessary to meet design requirements for a RCRA Subtitle C and PCB landfill are summarized in Section 2, Design Basis.

The ICDF landfill has been designed such that cumulative carcinogenic risk is less than or equal to $1 \times 10^{-4}$. As an overall design element, the ICDF landfill is protective of human health and the environment. The design capacity of the ICDF landfill is 390,000 $m^3$ (510,000 $yd^3$), as authorized by the ROD (DOE-ID 1999). The ICDF landfill is designed to have an operational life of 15 years, a post-closure period of 30 years, and an expected final cover design life of 1,000 years.

To develop the design for the ICDF landfill, several design calculations, studies, and evaluations were performed to determine key design parameters. Each of these are presented in an EDF, contained in Appendix Volumes 1 through 3. As described in Section 1.3 of this RD/CWP, some design elements have been finalized prior to the development of this document, and are therefore referenced but not included herein. A more detailed description of each of these EDFs is contained in Section 1.4, which describes the organization of this RD/CWP. The following EDFs were developed to support the design of the ICDF landfill:

- EDF-ER-266—Subsurface Consolidation Calculations
- EDF-ER-267—Landfill Compaction/Subsidence Study
- EDF-ER-268—Slope Stability Assessments
- EDF-ER-273—Permeable Reactive Barrier Evaluation Study
- EDF-ER-274—Leachate/Contaminant Reduction Time Study
- EDF-ER-275—Fate and Transport Modeling Results and Summary Report
- EDF-ER-276—Evaluation of Geotechnical Investigations Required to Complete Design and Construction
- EDF-ER-277—Waste-Soil Design Ratio Calculations
- EDF-ER-282—Seismic Evaluation of Landfill and Evaporation Pond
- EDF-ER-286—Waste Placement Plan.

The ICDF landfill is designed to only accept INEEL on-Site generated CERCLA wastes meeting the ICDF Landfill WAC, developed as part of this RD. The WAC is designed to protect the SRPA by limiting the hazardous and radiological constituents allowed in the landfill. The WAC also ensures that human health and the environment are protected. The ICDF Landfill WAC is provided as Appendix P to this RD/CWP:

- *Waste Acceptance Criteria for ICDF Landfill* (DOE-ID 2002b).

## 3.8 Evaporation Pond

The evaporation pond design consists of two individual cells to allow for maintenance in one cell while operations continue in the other pond. The evaporation pond has been designated and will be constructed as a CAMU in accordance with the substantive requirements of IDAPA 58.01.05.08 (40 CFR 264.552 and 40 CFR 264 Subpart K and CC).

Design of the evaporation pond focused on two key design calculations, which are described in more detail in Sections 1.3 and 1.4 of this RD/CWP:

- EDF-ER-323—Evaporation Pond Berm Overtopping Analysis
- EDF-ER-271—Evaporation Pond Sizing with Water Balance and Make-up Water Calculations.

The ICDF evaporation pond is designed to accept aqueous wastes such as purge water, decontamination liquids, and other INEEL CERCLA wastes meeting the ICDF evaporation pond WAC, developed as part of this RD. The WAC is designed to be protective of human health and the environment. The ICDF evaporation pond WAC is provided as Appendix Q to this RD/CWP:

- *Waste Acceptance Criteria for ICDF Evaporation Pond* (DOE-ID 2002c).

## 3.9 Landfill and Evaporation Pond Liners

The landfill liner is designed to meet or exceed radioactive, hazardous, and PCB waste landfill liner system criteria. The liner system, as designed, will facilitate protection of the SRPA. Two relevant calculations have been performed as part of the design effort to address the components of the landfill liner design:

- EDF-ER-281—Liner and Final Cover Long-Term Performance Evaluation and Final Cover Life Cycle Expectation

- EDF-ER-278—Liner/Leachate Compatibility Study.

In addition to the landfill liner design calculations, design specifications (SPC-1476) have been prepared to ensure that the landfill liner is installed to function as it is designed. The relevant specifications to ensure correct liner placement, integrity, and joining are as follows:

- Specification 02371, "Geotextiles," (SPC-1476)

- Specification 02661, "Geomembranes," (SPC-1476)

- Specification 02666, "Soil Bentonite Liner," (SPC-1476)

- Specification 02667, "Geosynthetic Clay Liner," (SPC-1476).

The evaporation pond liner design presented as part of this document includes an alternative liner system. This liner system is designed to minimize waste by reducing the prescriptive operations layer required by regulation. The Subtitle C design requirements allow for an equivalency determination, to propose a liner design that is equally protective of human health and the environment. To aid the equivalency analysis, an EDF was prepared to demonstrate the equivalency of the proposed evaporation pond liner system. "Evaporation Pond Lining System Equivalency Analysis" (EDF-ER-312), part of the 60% design package, presents the request for equivalency. During Agency comment resolution and finalization of EDF-ER-312 in the 60% design, it was decided that the proposed evaporation pond liner system would include a 0.9 m (3 ft) operations layer between the liners to serve as frost protection. The new design is presented in the design drawings (Appendix Z). The liner design for the evaporation pond that will be used includes the following layers, which start with the low permeability base soil from Rye Grass Flats as the base course:

- Geosynthetic clay liner (GCL)

- High-density polyethylene (HDPE)

- Geocomposite

- Operations layer—0.9 m (3 ft)

- GCL
- HDPE
- Sacrificial HDPE.

The alternate liner design presented here and shown in the design drawings (Appendix Z), has been approved for use at the ICDF evaporation pond by IDEQ.

## 3.10 Leachate Collection System

The LCS is designed with a double liner leachate collection/detection liner system that is integral to the landfill and evaporation pond liner systems. The LCS is designed to collect leachate from the landfill and transfer the leachate to the leachate collection sump. From the sump, the leachate can be pumped to the landfill crest pad building and ultimately transferred to the evaporation pond, following sampling. The ICDF LCS has several unique design characteristics that are not standard in ordinary construction, including double-walled pipe, material compatibility with ICDF landfill wastes, and separate high- and low-flow pumping systems.

Two design calculations were developed to provide the basis for the LCS design:

- EDF-ER-269—Leachate Generation Study
- EDF-ER-280—Landfill Leachate Collection System Design Analysis.

In addition to the design studies, design specifications have been developed to ensure the LCS is installed as designed. The applicable specifications for the LCS are: Specification 02371, "Geotextiles," Specification 02373, "Composite Drainage Net (Geocomposite)," and Specification 02661, "Geomembranes" (SPC-1476). Additional piping specifications that are necessary for the LCS are presented in Section 3.13.

## 3.11 Process Instrumentation and Control System

The ICDF Process Instrumentation and Control System (PICS) incorporates hardware and software, enabling operators to monitor and interface with process control systems both locally and remotely. The design details of the PICS are contained in the design drawings (Appendix Z).

## 3.12 Crest Pad Buildings

The landfill and evaporation pond crest pad buildings are designed to provide an enclosed area for sampling and maintaining the leachate pumps. The buildings are designed to be an insulated, engineered metal building system classified as Type II-N construction in accordance with the UBC, with metal wall panels and a standing seam metal roof. The crest pad buildings are designed for dead, live, snow, and wind loads in accordance with the design requirements. The crest pad buildings are designed with reinforced, cast-in place concrete foundations meeting the design requirements. Details of the crest pad building design are presented in the design drawings (Appendix Z).

The crest pad buildings each have a radiant heater for freeze protection and personnel comfort. The crest pad buildings are designed with fire alarm, voice paging, and evacuation systems.

Several design specifications have been developed to ensure the construction of the crest pad buildings are in accordance with the design. The applicable specifications, found in Appendix Y, are as follows:

- Specification 03301, "Reinforced Concrete," (SPC-1476)
- Specification 13122, "Metal Building Systems," (SPC-1476)
- Specification 16005, "Electrical," (SPC-1476).

## 3.13 Final Landfill Cover

The final landfill cover is designed to prevent intrusion for its 1,000-year design life. The design life for the final landfill cover is calculated in "Liner and Final Cover Long-Term Performance Evaluation and Final Cover Life Cycle Expectation" (EDF-ER-281).

Conceptual design and Title I design efforts evaluated the performance of an infiltration limiting cover. Title I design efforts concluded that the infiltration limiting cover would be the most successful cover design for the ICDF landfill, based on the site conditions present. Figure 3-2 identifies the various climatic conditions that have an effect on the final landfill cover, and depicts in a simplified manner how each component of the infiltration limiting cover functions.

The final cover design provides armored sides to protect against flooding, and prevent erosion of the cover over the 1,000-year design life of the landfill.

The cover is designed as an infiltration limiting cover, to minimize infiltration to the waste, thus reducing leachate generation and contaminant migration. The hydrologic characteristics of the final cover were modeled in "Hydrologic Modeling of Final Cover" (EDF-ER-279). The results of the modeling indicate a very low infiltration rate through the entire cover system. The low infiltration rate to the waste is attributed to the design of the final cover, which consists of three distinct functional elements, described below, and shown in a schematic as Figure 3-3:

- Upper section: The upper water storage component provides water storage during wet periods for later release into the atmosphere during dry periods.
- Middle section: The biointrusion component provides a drainage layer, protection from burrowing animals, and a capillary break.
- Lower section: The lower section includes a composite liner system that has a permeability less than or equal to the permeability of the landfill bottom liner system that complies with IDAPA 58.01.05.008 (CFR Part 264.310). Lateral drainage can occur above the composite liner system through a high-permeability drainage material.

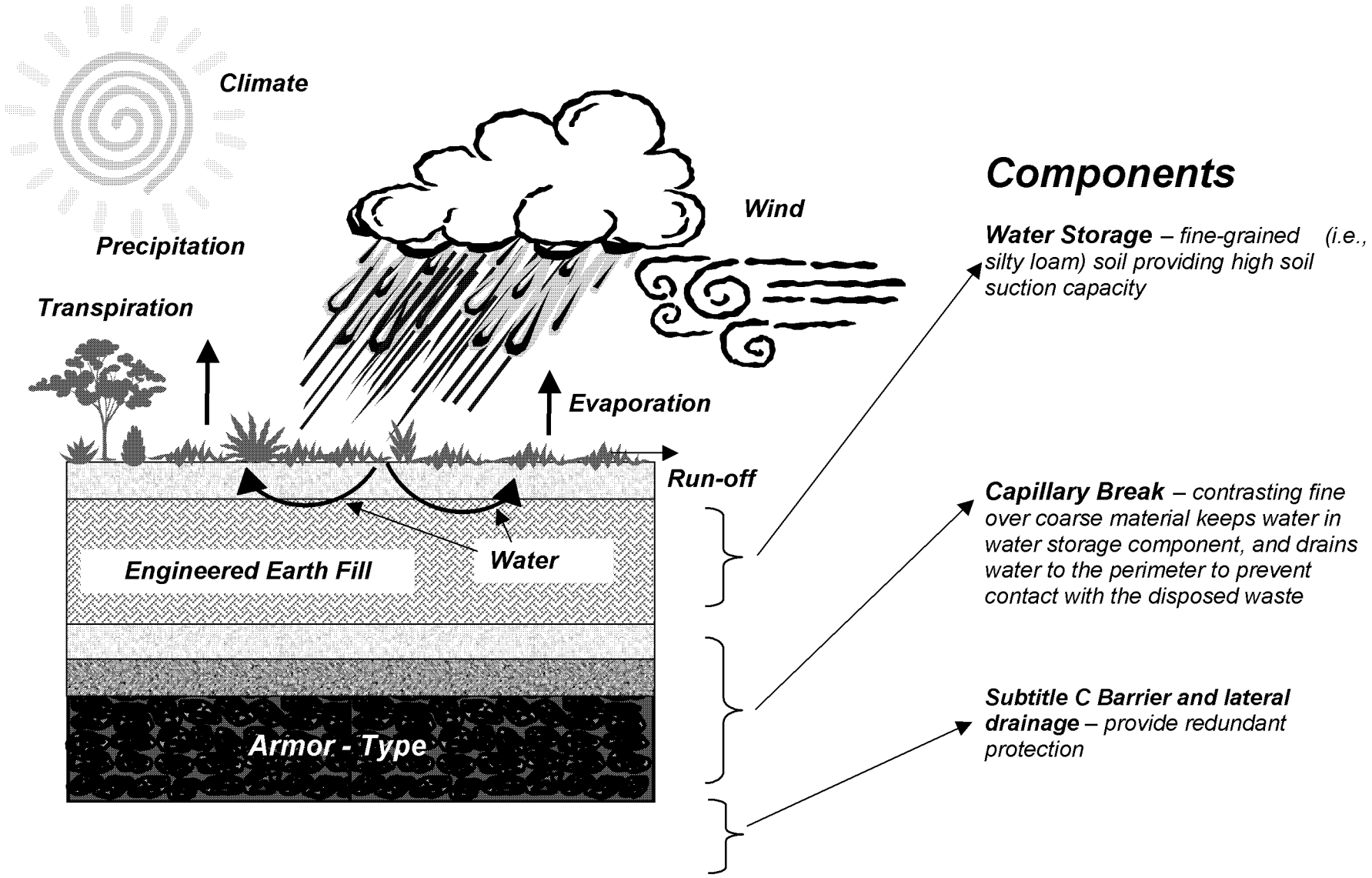


Figure 3-2. Simplified depiction of the infiltration limiting final cover for the ICDF landfill.

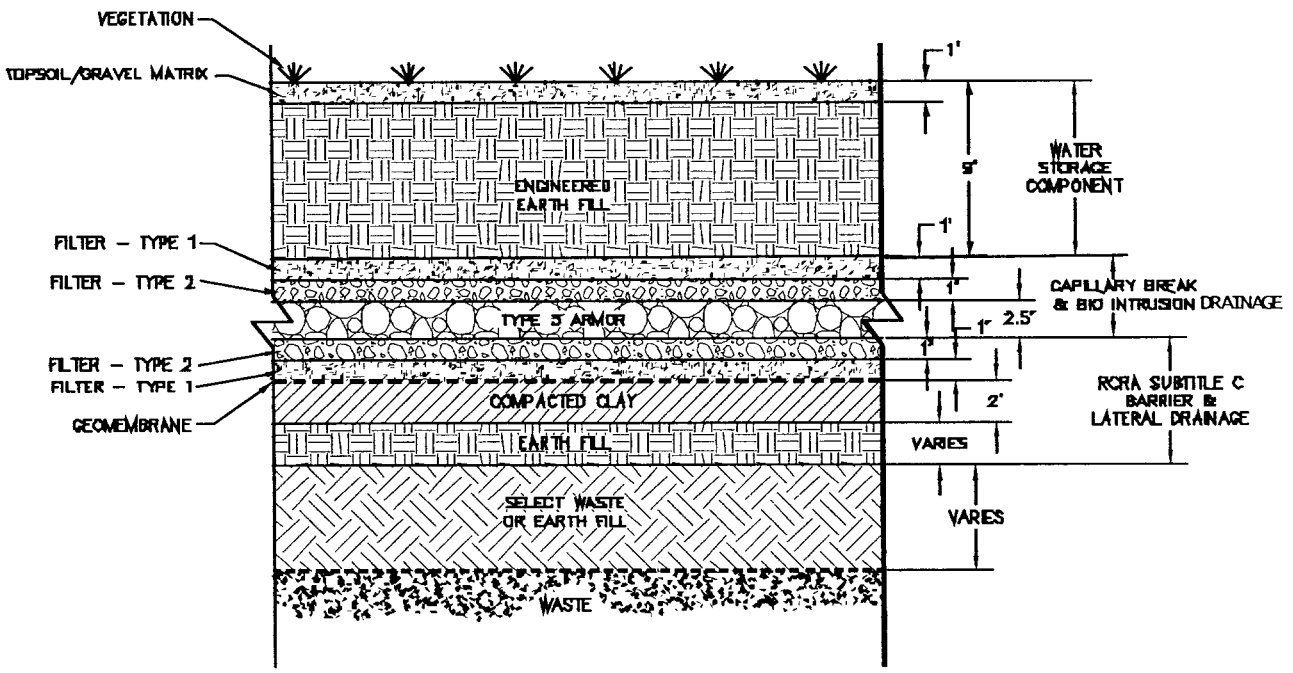


Figure 3-3. Schematic of the final landfill cover functional sections.

## 3.14 Piping

Piping has been designed as a component of the LCS to capture leachate in the liner system of the ICDF landfill, transfer the leachate to the landfill sump, allow pumping of the leachate from the landfill sump to the crest pad buildings and, ultimately, to the evaporation pond following sampling. Piping design is noted in the design drawings (Appendix Z) and in the specifications: Specifications 15060, "Piping;" 15021, "High Density Polyethylene (HDPE) Pipe;" and 15992, "Piping Leakage Testing;" (SPC-1476).

## 3.15 Warning Signs and Permanently Surveyed Benchmarks

Warning signs and permanently surveyed benchmarks will be established at the corners of the landfill to designate the boundaries of each waste cell for the design life of the landfill. Depending on the final closure alternative selected for the evaporation pond, permanently surveyed benchmarks may be established at the corners of the evaporation pond. Permanently surveyed benchmarks, which designate the location of subsurface contaminants, are designed to indicate the contaminants in the landfill (and possibly in the evaporation pond) to provide the necessary information to future land users. Other forms of institutional controls, including land use and access restrictions, will also be established at the ICDF landfill and evaporation pond, in accordance with the OU 3-13 ROD (DOE-ID 1999). The institutional controls, established in the ROD and implemented through the institutional control plan (DOE-ID 2001e), are designed to protect residential and industrial receptors during various periods of assumed land use. Closure and post-closure institutional controls will be included as part of O&M in the ICDF Complex RAWP.

## 3.16 Surface Water and Erosion Protection

Contouring and grading of the area surrounding the ICDF landfill and evaporation pond, as well as the slope of the final cover, have been designed to divert surface water flow from the open excavation

during construction, and from the waste disposal cells during operations. Revegetation of the area around the landfill and evaporation pond, along with the designed slopes, will encourage drainage without erosion. A project Storm Water Pollution Prevention Plan (Appendix V) has been developed for the ICDF landfill and evaporation pond construction, which will describe additional measures beyond the design specifications for surface water control and erosion protection.

The final cover design provides armored sides to protect against flooding, and prevent erosion of the cover over the 1,000-year design life of the landfill.

All disturbed areas will be revegetated in accordance with the "Guidance for Revegetation of Disturbed Areas at the Idaho National Engineering Laboratory" (DOE-ID 1989) and the design specifications. The final cover of the landfill will also be vegetated to reduce run-off velocity and wind erosion. The final cover will be sloped to divert surface water and minimize erosion. The areas directly surrounding the landfill cover will be contoured and graded to enhance drainage away from the cover, and revegetated to further slow water flow velocities and prevent erosion.

Design specifications were developed to mitigate site erosion and control surface in accordance with Specification 02920, "Reclamation and Revegetation" (SPC-1476).

## 3.17 Groundwater Monitoring

Groundwater monitoring will be performed to meet the operational and post-closure requirements for the ICDF landfill and evaporation pond. The monitoring will also assess the remedy performance of the ICDF landfill and evaporation pond in relation to the ROD RAOs and remediation goals (DOE-ID 1999). A groundwater monitoring plan (DOE-ID 2002e) has been developed to provide the necessary data to evaluate operational and post-closure performance, and provide the necessary data to evaluate the RAOs and remediation goals. Additionally, the groundwater monitoring plan is designed to establish background water quality in the SRPA prior to startup of the ICDF Complex operations, using an existing upgradient well and eleven new wells downgradient from the evaporation pond and landfill. Samples will be collected from the tertiary leak detection system sump and the LCS sump for comparison, and to determine if the landfill or evaporation pond liners have failed. The groundwater monitoring plan (DOE-ID 2002e) is included as Appendix S.

# 4. HUMAN HEALTH AND ENVIRONMENTAL COMPLIANCE

## 4.1 Remedial Action Objectives

The RAOs for OU-3-13 Group 3, ICDF landfill and evaporation pond, were developed in accordance with the National Contingency Plan (NCP) and are based on the results of the human health and ecological risk assessments outlined in the ROD (DOE-ID 1999). The Agencies selected RAOs for a particular site, depending on the affected media. The ROD outlines the general basis for the RAOs. The RAOs for the ICDF landfill and evaporation pond were developed using the following assumptions, which are included on page 8-1 of the ROD (DOE-ID 1999):

- The INTEC facility will be used as an industrial facility up to the year 2095. During DOE operations, which are expected to continue to at least 2045, the area will be a radiological control area.

- The annual carcinogenic risk at INTEC from natural background radiation due to surface elevation and background soil radiological contamination is $1 \times 10^{-4}$ (EPA 1994; NEA 1997; UNEP 1985).

- Permanent land use restrictions will be placed on those release site source areas and the ICDF Complex, that will be closed in place, for as long as land use and access restrictions are required for the protection of human health and the environment.

The RAOs are contained in Section 8 of the ROD, pages 8-2 and 8-3. The RAOs for OU 3-13 that are relevant to the ICDF were established for groundwater, the SRPA, and surface soils. Elements of each of the RAO sections are applicable to the design, operation, and closure of the ICDF landfill and evaporation pond.

To ensure protection of groundwater, the ROD RAOs require maintaining caps over the closed ICDF landfill to prevent the release of leachate to the underlying groundwater which would result in exceeding a cumulative carcinogenic risk of $1 \times 10^{-4}$, a total HI of 1; or applicable State of Idaho groundwater quality standards (i.e., MCLs) in the SRPA. From an exposure standpoint, the RAOs require that the ICDF landfill caps are maintained to prevent exposure to the public to meet a cumulative carcinogenic risk of $1 \times 10^{-4}$ and a total HI of 1. For the period prior to 2095, the RAOs require preventing on-site workers and the general public from ingesting SRPA groundwater that exceeds a cumulative carcinogenic risk of $1 \times 10^{-4}$, a total HI of 1; or applicable State of Idaho groundwater quality standards (i.e., MCLs). Beyond 2095, the RAOs require that SRPA groundwater does not exceed a cumulative carcinogenic risk of $1 \times 10^{-4}$, a total HI of 1; or applicable State of Idaho groundwater quality standards (i.e., MCLs). The RAOs also require that institutional controls be continued beyond 2095 for all capped areas (ICDF landfill) to prevent disturbance of the capped areas to achieve a cumulative carcinogenic risk of $1 \times 10^{-4}$ and a total HI of 1.

To meet the RAOs, remediation goals are established for the ICDF landfill and evaporation pond. The remediation goal for the ICDF landfill is to consolidate contaminated soils at a single location to prevent exposure of human and ecological receptors. This remediation goal will be accomplished by siting, designing, operating, and closing the ICDF landfill to prevent exposures or leachate releases to the underlying SRPA groundwater that exceed the RAOs. Design criteria to meet the RAOs are presented in Section 2 of this RD/CWP.

## 4.2 Applicable or Relevant and Appropriate Requirements

The ARARs are identified and discussed as part of the Technical and Functional Requirements (TFR-71) presented in Appendix CC. Under CERCLA, the project must meet the substantive, but not the administrative requirements of the ARARs. They are separated into three categories: (1) "Action-specific," (2) "Chemical-specific," and (3) "Location-specific." Another category, "To Be Considered (TBC)," outlines requirements that were considered in the ROD, and the substantive requirements are now applicable to the project.

1. Action-specific ARARs relate to the design, construction, operation, closure, and post-closure plans for the ICDF landfill and evaporation pond. These requirements also include site security, inspections, and personnel training at the ICDF landfill and evaporation pond. Idaho's fugitive dust rules and air pollution controls apply because they address activities at the ICDF landfill and evaporation pond. The Storm Water Discharge rules require control of run-off during construction activities. An evaporation pond will collect leachate, purge water, and other INEEL CERCLA-generated aqueous wastes that meet the evaporation pond WAC (DOE-ID 2002c), and will be managed as a surface impoundment and a CAMU under IDAPA 58.01.05.008 (40 CFR 264.221 and 40 CFR 264.552). The ICDF landfill and evaporation pond will be operated and closed under the substantive requirements outlined in IDAPA 58.01.05.008 (40 CFR 264 Subparts G, K, and N), and the landfill will also be built under the substantive design requirements for PCB landfills (40 CFR 761.75[b][1][2]). Equipment decontamination standards (IDAPA 58.01.05.008 [40 CFR 264.114] apply at closure and during operations.

2. Chemical-specific ARARs for characterizing waste (IDAPA 58.01.05.008 [40 CFR 261]) apply to characterizing hazardous wastes generated during remediation activities at the ICDF landfill and evaporation pond. Requirements for PCB disposal are applicable to wastes generated outside OU 3-13 (40 CFR 761.50[a],5[b], 3[b][7], [b][8], and [d][4]).

3. Location-specific ARARs relate to the new construction at the ICDF landfill and evaporation pond, and ensure that ICDF activities do not adversely affect archeological or Native American cultural resources. Preliminary studies show that the ICDF landfill and evaporation pond activities will not be triggered because the area is sited in a previously undisturbed area, and has been surveyed for archeological and cultural resources and received the appropriate clearances.

4. TBCs identify DOE policies limiting public exposure to radiation and ensuring worker safety.

# 5. CONSTRUCTION WORK PLAN

This section describes the management approach to accomplish the construction of the ICDF evaporation pond and landfill, the construction work elements, the associated schedule, and the documentation required to perform the action and to document its completion. Because the RD and the construction work plans are combined into one document for this project, some details of the implementation have already been described in the design sections of this document.

## 5.1 Relevant Changes to the RD/RA Scope of Work

This section specifies the relevant changes to the RD/RA SOW for WAG 3, OU 3-13 (DOE-ID 2000a). The described changes to the SOW have been discussed with and agreed to by the Agencies. The following subsections identify relevant changes to the RD/RA SOW.

### 5.1.1 ICDF Landfill and Evaporation Pond Construction Phasing

The first significant change to the RD/RA SOW for WAG 3, OU 3-13 (DOE-ID 2000a) is phasing the work scope of the ICDF evaporation ponds and the ICDF landfill to accommodate the early opening of the ICDF landfill and evaporation pond. Work will be phased in two stages. Stage I activities will be completed by December 31, 2001. These activities include early excavation of the landfill and evaporation pond and the construction of the bentonite test pad. These design activities are currently well defined and, consequently, represent low risk for significant future revisions of the ICDF landfill design. Stage II activities will commence after December 31, 2001, and include the ICDF landfill construction, evaporation pond construction, sloped test pad, and crest pad buildings. This RD/CWP, especially Section 5, which is prepared for the construction portion of the project, describes the activities that are necessary to construct, operate, and close the ICDF landfill and evaporation pond. This section of the document is written to provide the plan for work that will be performed during construction, rather than serve as a report of work that has been completed. Thus, many of the activities that have been substantially or partially completed during the Stage I construction activities, as well as certain operational requirements to be performed after construction, are included in subsequent sections, to provide the comprehensive RA plan for the ICDF landfill and evaporation pond. The operational and management aspects of the RA will be further developed in the ICDF Complex RAWP.

### 5.1.2 ICDF Evaporation Pond Liner

The second significant change is the design of the ICDF Complex evaporation ponds' lining system. Subtitle C (40 CFR Part 264) establishes regulatory requirements for design of lining systems for RCRA Subtitle C facilities. This regulation allows alternative lining systems, but requires that equivalency to the prescriptive (or standard) be demonstrated. "Pond Lining System Equivalency Analysis" (EDF-ER-312) was prepared with a proposed alternative evaporation pond lining system that was designed to function as effectively as the prescriptive Subtitle C lining system.

The alternate design was presented in the 60% design package, in EDF-ER-312. During Agency comment resolution and finalization of EDF-ER-312 in the 60% design, it was decided that the proposed evaporation pond liner system would include a 0.9 m (3 ft) operations layer between the liners to serve as frost protection. The new design is presented in the design drawings (Appendix Z). The liner design for the evaporation pond that will be used includes the following layers, which start with the low-permeability soil from Rye Grass Flats as the base soil:

- Rye Grass Flats Base Soil—0.3m (1 ft)

- GCL
- HDPE
- Geocomposite
- Operations layer—0.9 m (3 ft)
- GCL
- HDPE
- Sacrificial HDPE.

The IDEQ has approved the evaporation pond liner system presented above for the ICDF.

### 5.1.3 Reconfiguration of ICDF RD/CWP

The previously submitted ICDF RD/RAWP has been reconfigured to address operation and management concerns raised by the Agencies during efforts to finalize the previously submitted SSSTF RD/RAWP. The ICDF RD/RAWP and the SSSTF RD/RAWP will be split into two design/construction documents and one combined ICDF Complex remedial action document, addressing and resolving operational and management concerns raised by the Agencies. The reconfiguration proposes three primary documents: 1) the SSSTF RD/CWP, consisting of the design and construction documents prepared for the SSSTF; 2) the ICDF RD/CWP, consisting of the design and construction documents prepared for the ICDF landfill and evaporation pond; and 3) the ICDF Complex RAWP, consisting of the documents associated with operations and management of the ICDF Complex. The ICDF Complex RAWP will be presented to the Agencies for comment and finalization during the summer of 2002.

## 5.2 Subcontracting Plan

The selected contracting strategy for the ICDF landfill and evaporation pond construction was a competitively bid, design-build contract for the construction of Cell 1 and the evaporation ponds. The INEEL procurement process was followed and included issuing a request for proposal (RFP), pre-bid conference, bid evaluation, notice of award, notice to proceed, chartering and partnering meetings as needed, VDSs, and a pre-construction kick-off meeting. Several of these contracting activities will be ongoing throughout the ICDF Cell 1 and evaporation pond construction. The RFP specified, among other things, a strict period for performance that will correspond with the overall project schedule.

Once the construction of Cell 1 is complete, the construction work for Cell 2 could proceed. The INEEL procurement process would be followed, similar to the Cell 1 construction. The design for Cell 2 is provided in this RD/CWP, its appendices, and attached documents; future subcontracting for Cell 2 will be for construction only.

If funding availability becomes an issue, the construction of ICDF Complex components are scheduled for staged implementation. If necessary, multiple subcontracts could be implemented if the construction funds are spread over several years.

## 5.3 Remedial Action Work Tasks

The following sections identify the work elements required to implement and complete the ICDF landfill and ICDF evaporation pond construction. Additional detail can be found in the technical specifications (Appendix Y) and the project design drawings (Appendix Z).

### 5.3.1 Premobilization

Premobilization encompasses the activities performed before mobilization and construction begins. Requirements for VDS, training, and medical information specified by the design specifications and INEEL-specific requirements will be completed as required. All required documentation, bonds, insurance, and proof that all required training and medical examinations are complete in accordance with the construction HASP will be prepared prior to mobilization. These submittals certify that the project mobilization is ready to proceed. Design documentation will be AFC so that work can proceed in accordance with the documents. INEEL work control and job safety analyses will be completed before the notice to proceed, and the project will be placed on the INTEC plan of the week schedule.

### 5.3.2 Mobilization

Mobilization is the work required in preparation of the construction activities. This work generally implements the project and site-required administrative, engineering, and health and safety requirements. In preparation for work that must be done, electrical supply systems, communication systems, and water systems must be made available in the construction area so that field labor and equipment can be mobilized. The activities will include the following:

- High- and medium-voltage electrical power supply systems
- Low-voltage electrical power supply systems
- Raw water and fire water systems
- Office and equipment site preparation—if needed.

### 5.3.3 Storm Water Management and Sediment Control

Storm water will be managed according to the design presented in Section 3 of this RD/CWP and in compliance with the INEEL requirements contained in the project-specific Storm Water Pollution Prevention Plan (PLN-962). Temporary water management practices may be implemented as best management practices by using the following materials: silt fences, straw bale barriers, straw, stone, and riprap. Erosion control and storm water management will apply to all construction and construction support areas, including minor access roads and temporary stockpile areas. Temporary control measures for slope protection and controls to reduce erosion may be in place as required for all construction prior to commencement of construction. These temporary control measures will be coordinated with permanent erosion-control features to assure continuous and effective erosion control throughout the construction and post-construction periods.

### 5.3.4 Dust Control

Dust generation will be minimized during excavation, loading, hauling, dumping, and other construction activities that may generate dust. This will be accomplished by using water truck(s) and/or soil fixatives. Over-application of water resulting in free liquids will not be allowed in accordance with

waste minimization controls. Dust will be monitored at the borrow areas, the ICDF evaporation pond, and the ICDF landfill. If required and specified by construction management, surfactants may be used to mitigate dust control.

Work will be restricted or suspended if unacceptable amounts of dust are being generated as determined by the field team leader, health and safety officer, and/or radiological control technician (RCT). Dust may be the result of dry soil (which may require wetting down) or wind. All excavating, loading, hauling, and dumping operations will be evaluated when sustained wind speed reaches 25 mph or gusts of 30 mph or greater are recorded by the INEEL National Oceanic and Atmospheric Administration (NOAA) weather station, which will be periodically contacted by field project personnel when wind speeds are high. Several lost partial or full days will be anticipated due to high wind. Work areas that have the potential of generating dust will require spraying by a water truck.

### 5.3.5 Clearing and Grubbing the Sites

Clearing and grubbing, which is the clearing of vegetation and debris, will be performed in accordance with Specification 02200, "Site Preparation" (SPC-1476). Clearing and grubbing has taken place at the ICDF landfill and ICDF evaporation pond area, supporting haul roads, construction laydown areas, and initiated at the Rye Grass Flats Borrow Area under Stage 1 construction. Under Stage 2, additional clearing and grubbing will be necessary at the Rye Grass Flats Borrow Area. After adequate erosion and sediment controls have been placed with the use of bulldozers or appropriate construction equipment, the sites will be cleared of any interfering or objectionable material to the limits designated in the drawings (Appendix Z), or as directed by the construction manager. Interfering or objectionable material will either be hauled to another location at INTEC for future placement into the landfill or disposed in accordance with the direction of the construction manager.

Clearing and grubbing operations will be confined to those areas required for barrier construction or as directed by the construction manager. Any areas outside the designated areas that are damaged or disturbed by the construction operation will be repaired and seeded in accordance with Specification 02920, "Reclamation and Seeding" (SPC-1476).

### 5.3.6 Borrow, Haul, and Stockpile

Soil and rock as borrow material will be used, which has been hauled or stockpiled to be utilized for fill or as a soil admixture, as in the case of the bentonite admixture. Three types of borrow are required for this project: 1) native soil excavated from the ICDF landfill and evaporation pond excavation; 2) native low-permeability soil from the INEEL Rye Grass Flats Borrow Area; and 3) gravel for the ICDF landfill and evaporation pond liner system. Some borrow, haul, and stockpile work has been completed during Stage I (early excavation), during field season 2001, but is described in this section for a comprehensive project description. For the bentonite admixture, the Rye Grass Flats Borrow Area will be cleared and grubbed. The area will be excavated using conventional excavation equipment for the base soil of the bentonite admixture in accordance with Specification 02317, "Borrow Area Excavation" (SPC-1476). Borrow area will be developed and operated in accordance with the mitigation measures specified in the Environmental Assessment and Plan for New Silt/Clay Source Development and Use at the INEEL (DOE 1997). Mitigation and reclamation measures required by this document will be reviewed and approved by the construction manager prior to borrow area development. Soil excavated from the Rye Grass Flats Borrow Area will also be used for the structural fill of the ICDF evaporation pond. For the structural fill of the ICDF evaporation pond, the 1-ft structural fill will be comprised of low-permeability base soil from the Rye Grass Flats Borrow Area. Material that is excavated with conventional excavation equipment for the ICDF landfill and ICDF evaporation pond that is not immediately placed in fill locations will also be stockpiled for later use as fill material. In general,

clearing and grubbing of a site location will be performed to the project limits designated in the drawings (Appendix Z). Adequate erosion control and sediment controls will be in place prior to borrow excavation and will be maintained throughout the excavation process until closure of the excavation site. Soil will be excavated by excavators and bulldozers. Borrow and stockpiled material will be loaded by excavators or loaders into haul trucks and taken to areas designated by the construction manager for use in roadways, haul roads, ICDF landfill and evaporation pond bentonite preparation, berms, and as clean fill material.

Borrow that is not immediately excavated and hauled will be stored in either permanent or temporary stockpiles. "Permanent" stockpiles are a stockpile of material that remains at the completion of construction. Material from the "permanent" stockpile may be used when closing the facility. Temporary stockpiles are of material to be utilized during construction and will be removed prior to the completion of construction. All stockpiles will be maintained in accordance with Specification 022315, "Fill and Backfill" (SPC-1476).

### 5.3.7 Soil Excavation

***5.3.7.1 Soil Excavation at the Borrow Area.*** Soil excavation at the Rye Grass Flats Borrow Area consists of excavating low-permeability soils. This low-permeability soil will be hauled to the cell/evaporation pond construction area and mixed at a designated location in or near the landfill shown in the drawings (Appendix Z) to form the bentonite soil mixture for the CCL at the ICDF landfill. The low-permeability soil will also be utilized as the structural fill for the ICDF evaporation pond liner. Excavation will be performed within the limits specified in the Specifications (SPC-1476). Excavation will be done by excavators and bulldozers. Bulldozers will push the soil to the loading area and a loader will load clean fill into haul trucks.

***5.3.7.2 Soil Excavation at the ICDF Evaporation Pond.*** Soil excavation at the ICDF evaporation pond consists of excavating the evaporation pond subgrade area as shown in the drawings (Appendix Z). Prior to excavating the area was cleared and grubbed as required. Excavators, bulldozers, and other heavy equipment were used to perform the excavation. Excavated soils were used to create the berms surrounding the evaporation pond. Excavation was performed in accordance with Specification 02316, "Excavation" (SPC-1476).

Following excavation of the evaporation pond, the soil will be prepared for liner placement. This subgrade preparation will be in accordance with Specification 02319, "Subgrade Preparation" (SPC-1476). Soil excavation at the evaporation pond will also consist of excavating pipe trenches for the leachate piping, supporting utilities and instrumentation, and the anchor trench for the liner. The excavation for these activities will require coordination and will follow the construction schedule sequence. Excavation will follow Specification 02316, "Excavation" (SPC-1476).

***5.3.7.3 Soil Excavation at the ICDF Landfill.*** Soil excavation at the ICDF landfill was similar to that performed at the ICDF evaporation pond, and consisted of excavating the landfill subgrade area required and as shown in the drawings (Appendix Z). Prior to excavating, the area was cleared and grubbed as required. Excavators, bulldozers, and other heavy equipment were used to perform excavation. Excavated soils were used to create the berms surrounding the landfill. Excavation was performed in accordance with Specification 02316, "Excavation" (SPC-1476).

Following excavation of the landfill, the soil will be prepared for liner placement. This subgrade preparation will be in accordance with Specification 02319, "Subgrade Preparation" (SPC-1476). Soil excavation at the landfill will also consist of excavating pipe trenches for the leachate piping, supporting utilities and instrumentation, and the anchor trench for the liner. The excavation for these activities will require coordination and will follow the construction schedule sequence. Excavation will follow

Specification 02316, "Excavation" (SPC-1476). Excess soil from the excavation of the landfill and the evaporation pond was stockpiled south of the siting study area.

### 5.3.8 Soil Consolidation

Soil required for fill material on the berms, roads, landfill, ponds, and haulways, as well as the bentonite mixture, required some type of soil consolidation—that is, strengthening through compaction to a specification of relative compaction. The specification requirements for each soil application were followed.

For the compacted clay liner (CCL) in the ICDF landfill, the preselected base soil will be hauled to the landfill and stockpiled. It will be subsequently mixed with bentonite admixture. The soil will be placed in lifts and compacted using conventional compaction equipment and water as allowed. The CCL will follow Specification 02666, "Soil Bentonite Liner" (SPC-1476). For other soil applications the soil will be placed to the maximum height allowed per lift. The soil will then be compacted using conventional compaction equipment and additional moisture may be required to obtain adequate compaction. Soil consolidation will be in accordance with Specifications 02315, "Fill and Backfill" and 02319, "Subgrade Preparation" (SPC-1476).

### 5.3.9 Construction Activities

The construction activities of the ICDF landfill and ICDF evaporation pond, as described below, will be performed in the sequence of the construction schedule. All the requirements for pre-mobilization will be completed. After pre-mobilization activities are complete, equipment and personnel will mobilize and begin operation. Fencing and gates to protect the worker areas will be established and in place. Prior to the commencement of any work activities, soil stabilization and slope protection and controls will be established and in place to reduce erosion, sedimentation, and water pollution through the use of erosion-control devices. Dust control measures, primarily by water trucks, will also be in place and utilized as necessary to control dust from the construction sites.

The specific work elements for this RD/CWP include the following:

- Excavation of the Rye Grass Flats Borrow Area and developing the soil bentonite admixture
- Excavation and filling of the ICDF landfill and the evaporation ponds
- Excavation, filling, and grading of the haul roads, access roads, and the crest building pads
- Construction of the crest buildings
- Construction of the ICDF landfill liner and ICDF evaporation pond liner
- Construction of the leachate system piping, instrumentation, and utilities for the ICDF landfill and ICDF evaporation pond.

***5.3.9.1 Bentonite Clay Mix.*** The bentonite clay mixture is a mixture of a commercially prepared bentonite admixture and accepted low-permeability base soil from the Rye Grass Flats Borrow Area. The bentonite clay mix is used as the primary CCL in the ICDF landfill. For the compacted clay layer of the ICDF landfill, the bentonite liner consists of a bentonite clay mix, an admixture that consists of natural soil that is mixed with bentonite and moisture conditioned. The bentonite clay mix will be prepared and processed according to Specification 02666, "Soil Bentonite Liner" (SPC-1476).

***5.3.9.2 Transport, Placement, and Compaction of Bentonite Clay.*** Low-permeability base soil from the Rye Grass Flats Borrow Area will be transported to the ICDF landfill site by haul trucks and stockpiled. The stockpiled soil clay will be mixed with bentonite clay, and the clay mix will be placed in lifts to the lines and grades shown in the construction drawings (Appendix Z). The first lift will be a maximum of 8 in. thick and will be carefully placed to minimize mixing the soil bentonite with the excavated subgrade. Subsequent lifts will be placed at a maximum thickness of 6 in. Each lift will be compacted with conventional compaction equipment. Soil bentonite liner (SBL) placement and compaction will follow Specification 02666, "Soil Bentonite Liner" (SPC-1476). Care will be taken to maintain the required compaction, hydraulic conductivity, uniformity, and the moisture content throughout the construction and post-construction of the bentonite clay liner. The SBL surface will be maintained in a condition suitable for geomembrane installation until the surface is covered.

***5.3.9.3 Primary and Secondary Geomembrane Liners.*** Geomembrane liners act as barriers to contain liquids that have leached from the ICDF evaporation pond and ICDF landfill. The geomembrane lining system for both the evaporation pond and the landfill are constructed of HDPE. The geomembrane work includes manufacture, fabrication, supply, and installation of geomembrane. Geomembrane will be used for lining of the landfill and the evaporation pond and for other applications, as shown in the drawings (Appendix Z). Prior to beginning geomembrane installation, the proposed methods for geomembrane deployment, panel layout, seaming, repair, and protection will be developed in a plan, which will include a quality control (QC) program related to geomembrane installation. Prior to placing the geomembrane, a surface will be prepared that will be smooth and clean, which will provide a firm and unyielding surface for the geomembrane. The geomembrane installer will certify in writing that the surface on which the geomembrane will be installed is acceptable. The anchor trench will be constructed. Each geosynthetic layer will be anchored with a minimum 6-in.-thick compacted lift of compacted soil within the anchor trench in accordance with Specification 02661, "Geomembranes" (SPC-1476).

Geomembrane panels will be installed at locations indicated in the layout plan, as approved or modified. Geomembrane placement and seaming will follow Specification 02661, "Geomembranes" (SPC-1476). Material testing will be in accordance with the *ICDF Construction Quality Assurance Plan* (DOE-ID 2002f).

***5.3.9.4 Leachate Collection Recovery System.*** The LCS is an engineered collection system to collect both primary and secondary leachate at the ICDF landfill and to allow for disposition of the leachate collected. Primary leachate is contaminated water that drains from the LCS and secondary leachate is water that drains from the drainage system between the primary and secondary liners. The LCS will be constructed during the construction of the ICDF landfill and the ICDF evaporation pond. The overall system consists of the in-cell drainage/sumps, collection piping, and the evaporation pond liner system. Monitoring of the leachate will occur at the crest pad buildings. Leachate piping will be excavated and placed according to the drawings (Appendix Z) and in accordance with the following specifications: Specification 11312, "Leachate Pumps," Specification 15021, "High-Density Polyethylene Pipe," Specification 15060, "Piping General," and Specification 15992, "Piping Leakage Testing" (SPC-1476). In general, the leachate pumps area will be excavated and the piping will be excavated, placed, tested, and backfilled. Concrete thrust blocks, electrical controls, and monitoring equipment will also be placed in order to support the leachate recovery system.

***5.3.9.5 Site Roadways and ICDF Landfill Access Ramps.*** The ICDF roadway will be constructed with asphaltic concrete and will accommodate the movement of waste transport vehicles having a maximum single axle weight of 20,000 pounds. Roadways will be designed in accordance with the Idaho Transportation Department, Division of Highways, Standard Specification of Highway Construction. Site roadways will follow the lines and grades established in the plans.

Haul roads will be constructed within the ICDF landfill Cell 1 to provide a clean haul road to the active disposal area. Initially, haul roads will be constructed to provide access across the operations layer to the initial disposal area in the northwest corner of Cell 1. Subsequent haul roads will be built up, graded, and compacted to correspond with the changing cell elevations as the cell is being filled with wastes. Because fill placement may be occurring on several layers at a time, subsequent haul roads will be constructed on top of the compacted waste fill to allow access to the various layer of fill construction. Haul roads that are placed on top of waste fill will consist of a separation layer of clean fill, called an operational layer, so that the integrity of the haul road is maintained. Haul roads will be a minimum of 1 ft thick and consist of 6 in. minimum of compacted granular fill (operations layer) and a 6-in. upper layer of crushed rock. Haul roads will typically be 30 ft wide to allow two-way traffic with adequate turning radius.

***5.3.9.6 Drainage Culverts and Ditch Areas.*** Drainage culverts and ditch areas will be excavated as shown in the drawings (Appendix Z) and as needed to support the O&M water management.

***5.3.9.7 Crest Pad(s) and Crest Pad Buildings.*** The crest pad for the ICDF landfill is located on the north side of the landfill. The crest pad for the ICDF evaporation pond is also located on the north side of the evaporation pond. The subgrade and foundation for the crest pad buildings will be prepared according to Specification 02315, "Fill and Backfill" (SPC-1476). Earth fill placed beneath future buildings will have a maximum particle size of 3 in. in the greatest dimension. Earth fill will be placed in lifts of 6 in. maximum compacted thickness and each lift compacted to a minimum of 95% relative compaction. Coordination will be required between the earthwork, piping, and instrumentation required at the crest pad location.

The crest pad buildings contain the instrumentation and system components for the LCS. All system components within the crest pad buildings will be enclosed, including, but not limited to, sump pipes, headers, flow meters, sample ports, VARVs, etc. Crest buildings will be designed and constructed in accordance with the DOE-ID Architectural Engineering Standards (DOE-ID 2000d). A prefabricated pre-engineered metal building will be furnished and installed complete and as shown in the drawings (Appendix Z) and as specified in Specification 13122, "Metal Building Systems Buildings" (SPC-1476).

The crest pad buildings support the function of the landfill and the evaporation pond. The crest pad buildings are positioned at the crest of both the landfill and the evaporation pond, and house the controls for the pumps, sumps, and monitoring equipment. The crest pad building at the evaporation pond will have the ability to sample leachate prior to leachate being sent to the evaporation pond. The crest pad building at the evaporation pond will house and work in conjunction with the landfill operations to control leachate being pumped into the evaporation pond.

Construction of the crest pad buildings will be performed after the evaporation pond berms are constructed. The foundation for the crest pad building will be shaped and compacted as shown in the specifications (Appendix Y) and drawings (Appendix Z). Footings will be poured and metal buildings will be constructed and coordinated with the supporting leachate instrumentation and piping. Power and water will be brought to the crest buildings as shown in the drawings (Appendix Z). All instrumentation and piping will be tested prior to acceptance. The crest pad buildings must be completed prior to waste placement into the landfill.

***5.3.9.8 Heating and Ventilation for Crest Pad Buildings.*** Heating and ventilation for the crest pad buildings is required to protect the instrumentation and equipment from harsh weather conditions. Natural draft ventilation will be provided in the design of crest pad buildings for warm-weather operations. Appropriate heating and insulation will be provided for freezing cool-weather operations and cooling for warm-weather operations as necessary for specified instrumentation. Heating and ventilation

will follow the drawings (Appendix Z) and construction will be in accordance with Specification 13122, "Metal Building Systems," and all Division 15 and Division 16 specifications as necessary (SPC-1476), which includes but is not limited to Specification 16005, "Electrical."

***5.3.9.9 ICDF Site Monitoring Instrumentation.*** ICDF instrumentation is used to monitor and pump the leachate recovery and the leachate unloading/loading station. The monitoring instrumentation consists of the control instrumentation in the crest pad building and the leachate unloading/loading station control instrumentation. ICDF site monitoring instrumentation will follow Specifications 13401, "Process Instrumentation and Control Systems;" 16005, "Electrical;" and 16480, "Low Voltage Motor Control" (SPC-1476). Work will include engineering, furnishing, installing, calibrating, adjusting, testing, documenting, starting up, and training for a complete PICS.

***5.3.9.10 Components and Facilities for Pumping and/or Gravity Flow of Leachate.*** As leachate percolates through the waste, it will be collected in the LCS. The leachate gravity drains through gravel and collection pipes to the LCS sump, where it is pumped through a double-walled conveyance system to the evaporation pond. The LCS piping is constructed to allow leachate to recirculate to the landfill crest pad building and back to the landfill leachate sump for sampling purposes. The leachate pumping/transfer system includes, but is not limited to, pumps, sample ports, detection instrumentation, flow meters, and piping. At the evaporation pond, a loadout area with secondary containment to allow loading of leachate from the evaporation pond into tankers for transport to a treatment facility is provided for emergency purposes. Leachate piping and pumping will follow Specifications 11312, "Leachate Pumps;" 13401, "Process Instrumentation and Control Systems;" 15021, "High-Density Polyethylene Piping;" 15060, "Piping – General;" and 15992, "Piping Leakage Testing" (SPC-1476).

### 5.3.10 Test Pad

The discussion of test pad construction presented in this section is separate from the test pad construction that was performed as part of Stage I construction. During Stage I construction, a preliminary test pad was constructed at the Rye Grass Flats area. A flat test pad was constructed near the ICDF landfill Cell 1 site. Lifts were placed at the test pad, compacted, and tested to ensure appropriate compaction requirements were met. The test pad constructed during Stage I was used to develop the specifications (SPC-1476) necessary for Stage II construction. Testing details of the Stage I test pad are contained in EDF-2899.

Construction of the sloped soil bentonite test pad will be coordinated with the construction of the landfill and the excavation of the Rye Grass Flats Borrow Area. A sloped test pad for the SBL will be constructed on a 3:1 slope as specified to determine acceptable processing, placement, and compaction methods to produce a low-permeability SBL in accordance with Specification 02666, "Soil Bentonite Liner" (SPC-1476). The location of the test pad will be shown in the drawings (Appendix Z).

The test pad will be constructed with the same soil materials, design specifications, equipment, and procedures as proposed for the full-scale landfill. The test pad will be constructed on a 3 horizontal to 1 vertical side slope to evaluate compaction methods and performance on the side slope. So that the test pad will accurately represent the performance of the full-scale landfill, the following guidelines will be followed.

The test pad will be constructed at least four times wider than the widest piece of construction equipment used to build the test pad or 40 ft minimum. This is required to ensure a sufficient representative area for testing, avoiding the edges of the test pad. The test pad may be subdivided into "lanes" to facilitate evaluation of different compaction methods. However, the width of any individual lane will be no less than twice the width of the widest piece of construction equipment. The test pad will

be long enough to allow construction equipment to achieve normal operating speed before reaching the area that will be used for testing or 80 ft minimum (whichever is greater). The test pad will be constructed with at least six lifts to evaluate the methodology used to tie lifts together in accordance with Specification 02666, "Soil Bentonite Liner" (SPC-1476).

No SBL will be placed on slopes until the test pad has been constructed and the results from all test methods indicate that the SBL will satisfy all requirements specified and the testing requirements of the *INEEL CERCLA Disposal Facility Construction Quality Assurance Plan for Excavation and Constructing and Testing of Clay Liner and Test Pad* (DOE-ID 2001d). After all testing has been completed and approved, the material in the test pad can be used for liner construction provided that the material satisfies the requirements of the SBL specification.

### 5.3.11 Earthwork

The earthwork on this project will be defined as the following:

- Excavation of the Rye Grass Flats Borrow Area and construction of the sloped soil bentonite test pad on a 3:1 slope
- Hauling, mixture, and placement of the soil bentonite clay
- Excavation/backfill of the ICDF landfill and ICDF evaporation pond
- Excavation/backfill of the haul roads required for this project
- Excavation/backfill of the crest pad building foundations
- Excavation/backfill for the leachate collection piping and utility piping.

The earthwork activities will follow the project schedule included as Appendix AA and as directed by the construction manager. For each designated work area or portion of the work sequence, earthwork will only occur after adequate erosion and sediment controls are in place. Dust control measures will be established and utilized as necessary to control dust. If an area has not been cleared and grubbed, then clearing and grubbing will be the initial earthwork activities. Care will be taken to protect existing vegetation that does not need to be removed. All earthwork will be performed in accordance with the project specifications (SPC-1476) and the project design drawings (Appendix Z).

### 5.3.12 ICDF Landfill Construction

The ICDF landfill construction will follow the project schedule (Appendix AA), drawings (Appendix Z), specifications (SPC-1476), and BBWI, INEEL, and DOE regulations. The ICDF landfill will be built in two phases: construction of Cell 1 and construction of Cell 2. The total volume of wastes that is planned to be disposed at the ICDF landfill over its operating lifetime will be 510,000 $yd^3$. Waste proposed for disposal at the ICDF landfill consists of low-level waste, hazardous waste defined under RCRA, waste defined under TCSA, including PCBs, and mixed waste (a combination of radioactive and hazardous types). Wastes are expected to be predominantly contaminated soils from OU 3-13 and other areas within INEEL, debris that is stored in the Staging and Storage Area (SSA) and building demolition debris, and other wastes that are shown to meet the ICDF Landfill WAC (DOE-ID 2002b). The construction activities for the ICDF landfill will be defined as the following:

- Excavation/fill of Cell 1

- Subgrade preparation
- Placement of required leachate piping
- Load/haul/placement of the CCL
- Construction of the ICDF landfill liner
- Acceptance of the ICDF landfill liner
- Construction of the Crest Pad and Crest Pad Buildings
- Load/haul/compaction of haul roads into the ICDF landfill Cell 1
- Load/haul placement of wastes
- Load/haul/place/compact ICDF landfill operations layer.

Construction will initiate with Cell 1. Construction of Cell 2 will begin when Cell 1 nears or has reached capacity, or when other project considerations indicate construction should be initiated. Although the design of Cell 2 is addressed in this RD/CWP, the construction of Cell 2 is not a part of this RD/CWP.

### 5.3.13 ICDF Landfill Liner Construction

The ICDF landfill liner has been designed to contain INEEL-generated wastes that will be placed in Cell 1 and Cell 2. The ICDF landfill liner is a composite system consisting of both a primary and secondary geomembrane that will prevent migration of hazardous wastes outside of the liner system. The liner will be constructed separately for each landfill cell. Scheduling of the Cell 2 construction will occur at a later date, after Cell 1 has been in operation, is nearing or has reached capacity, or when other project considerations indicate construction should be initiated. Installation of the liner for Cell 1 will be in strict accordance with the specifications (SPC-1476) and the *INEEL CERCLA Disposal Facility Construction Quality Assurance Plan* (DOE-ID 2002f). The construction activities for the ICDF landfill liner construction will be defined as the following:

- Construct secondary leak detection recovery system (SLDRS)
- Load/haul/place/compact clay layer on prepared subgrade
- Place secondary geomembrane
- Place leak detection recovery system (LDRS) gravel, piping, and instrumentation
- Place geocomposite LDRS
- Place GCL
- Place primary geomembrane
- Construct the leachate collection recovery system (LCRS)
- Place geotextile cushion

- Load/haul/place/compact operations layer.

Construction of the ICDF landfill liner will require coordination for earthwork, geomembranes, geotextiles, gravel, piping, and instrumentation. A 3-ft thick operations layer will be placed over all clay liner sections constructed prior to winter shutdown. If construction is expected to occur during periods of potential soil freezing (after November 1), a decision will be made by October 1 to determine minimum requirements for protection of the clay liner.

### 5.3.14 ICDF Evaporation Pond Construction

The ICDF evaporation pond is designated as a CAMU in accordance with the substantive requirements of IDAPA 58.01.05.008 (40 CFR 264.552 and 40 CFR 264 Subpart K and CC) for the purpose of managing ICDF landfill leachate, other aqueous wastes generated as a result of operating the ICDF Complex, and INEEL CERCLA aqueous wastes that meet the evaporation pond WAC. The evaporation pond will accept ICDF landfill leachate and potentially contaminated aqueous waste streams generated from the INTEC and other INEEL CERCLA actions, development water from monitoring well drilling operations, and secondary aqueous wastes generated from waste processing and decontamination activities in the SSSTF and other INEEL CERCLA projects. Wastes accepted in the ICDF evaporation pond will meet the ICDF Evaporation Pond WAC (DOE-ID 2002c).

The ICDF evaporation pond system consists of two 2,200,000-gallon capacity ponds that will contain the aqueous wastes. The pump system will track the volume of waste disposed to the pond.

Construction of the ICDF evaporation pond will be similar to the construction of the ICDF landfill and will require a coordinated effort. The construction activities for the ICDF evaporation pond will be defined as the following:

- Excavation of the ICDF evaporation pond
- Subgrade preparation
- Load/haul/placement of the structural fill
- Construction of the ICDF evaporation pond liner
- Acceptance of the ICDF evaporation pond liner
- Construction of the crest pad building
- Installation and testing of the leachate collection piping and instrumentation.

### 5.3.15 ICDF Evaporation Pond Liner Construction

The ICDF evaporation pond has been designed to contain landfill leachate and other aqueous wastes as stated in Section 5.3.14. The ICDF evaporation pond liner serves to prevent migration of hazardous constituents and allow leak detection. The current design of the ICDF evaporation pond lining system includes an operations layer and a composite liner system, consisting of three geomembranes (sacrificial, primary, and secondary) and two GCLs (primary and secondary).

The construction activities for the ICDF evaporation pond liner construction will be defined as the following:

- Load/haul/place/compact structural fill, comprised of material from Rye Grass Flats, on prepared subgrade
- Place secondary GCL
- Place secondary geomembrane
- Place LDRS gravel, piping, and instrumentation
- Place geocomposite LDRS
- Construct operations layer—0.9 m (3 ft)
- Place primary GCL
- Place primary geomembrane
- Place sacrificial geomembrane.

The upper HDPE geomembrane is a sacrificial liner that provides protection from ultraviolet light and a measure of puncture protection to the upper, primary geomembrane. A GCL is provided as equivalent protection to one layer 3 ft of $1 \times 10^{-7}$ cm/sec clay (beneath the secondary geomembrane) to allow the pond to function through temperature extremes at the INEEL (EDF-ER-312). The evaporation ponds are designed for operating periods of 15 years for the active life of the landfill, and 30 years for post-closure.

### 5.3.16 Reclamation Seeding

Reclamation and seeding will take place in all disturbed soil areas as described in the specifications (SPC-1476) and shown in the drawings (Appendix Z). The soils will be tilled a minimum depth of 6 in. and a minimum of 6 in. of topsoil will be tilled into the seedbed. The seedbed will be firm below seeding depth, well pulverized, and loose on top. It will be free of clods and weeds.

Reclamation and seeding will be in accordance with Specification 02920, "Reclamation and Revegetation" (SPC-1476). Reclamation and revegetation will be performed in accordance with the guidelines specified in *Guidelines for Revegetation of Disturbed Sites at the INEL* (DOE-ID 1989). The work for seeding will be done between October 10 and November 30. Specific ideal seeding times within these windows will be as required for proper seedbed preparation.

### 5.3.17 Demobilization

Following completion of the ICDF landfill and ICDF evaporation pond construction, equipment and personnel will demobilize from the site. The office trailer(s) and equipment will be removed from the site. Temporary fencing and signage will also be removed and disposed appropriately.

### 5.3.18 Institutional Controls

Field activities conclude with the establishment of institutional controls. Institutional controls at the ICDF Complex are intended to prevent inadvertent intrusion and restrict access. Fencing and signs will be installed to protect the ICDF Complex.

Written notification of the RA will be included in the facility master plan, prohibiting any activities that would interfere with the remedial activities. A copy of the notification will be given to the BLM along with a request that such notification will be placed in their property management records. The DOE will provide written verification to the EPA, and the IDEQ that notifications, including BLM notification, have been fully implemented, in accordance with the ROD (DOE-ID 1999).

### 5.3.19 Transportation, Placement, and Compaction of Waste Layers

The transportation, placement, and compaction of layers will follow "Waste Placement Mapping Plan" (EDF-ER-322) and "Waste Placement Plan" (EDF-ER-286). Transportation of soils and wastes will be done primarily by haul trucks. Haul trucks leaving the SSSTF will carry wrapped wastes in clean trucks on haul roads of clean fill material into the landfill. Within the landfill, haul roads will be constructed of clean operational fill, which will be inspected and maintained clean. The haul trucks will be directed to designated unloading areas. The haul trucks, while remaining in a clean area, will unload contaminated loads into the edge of the contamination zone, where designated landfill equipment will push and compact the material into its final destination. If a haul truck is found to become contaminated, it will be cleaned at the landfill and generated waste-contaminated materials from cleaning the haul truck will be placed into the landfill, as long as the waste meets the landfill WAC. Waste placement will begin in the northwest corner of the landfill and will proceed to the northeast. Material will be spread in 1-ft lifts by a bulldozer and will be compacted by either a bulldozer or a compactor in accordance with internal operating procedures. Water may be added during both the spreading and compaction to produce a waste material that is near optimum moisture content to aid in compaction. Water conservation practices will be maintained to minimize waste, but contain dust and achieve compaction. Waste placement will be tracked according to a grid system in accordance with "Waste Placement Mapping" (EDF-ER-322) and will follow "Waste Placement Plan" (EDF-ER-286). Approved waste profiles will be stored in the project records.

### 5.3.20 Groundwater Monitoring

Existing data at INTEC show a presence of RCRA-listed wastes and radionuclides in perched water zones and the SRPA. It is noted that these contaminants may also be present in saturated zones underlying INTEC and the ICDF Complex. A groundwater monitoring plan (DOE-ID 2002e) has been developed to evaluate the presence of these contaminants. As part of the detection monitoring program, preliminary sampling will be performed to develop baseline data before operation of the ICDF Complex begins. Approximately 11 detection wells will be installed concurrent with the 2002 Stage II construction activities. The groundwater monitoring plan will describe the monitoring and sampling plans in detail. The work elements for drilling are described below.

#### *5.3.20.1 Drilling Work Elements*

As part of the detection monitoring program, monitoring wells will be installed during the Stage II construction season to determine existing background data associated with Group 4 (perched water) and Group 5 (SRPA) contamination. Installation is to begin on June 1, 2002, and will be completed on or about September 30, 2002. The groundwater monitoring plan describes the drilling and sampling plan, and is briefly reviewed below.

Five new wells will be installed to detect contaminants in the SRPA, using the following assumptions:

- Two new wells will be installed downgradient of the evaporation pond.

- Three new wells will be installed downgradient of the landfill cells.
- The wells will be located approximately 66 ft. (20 m) south of the edge of the construction road to allow construction vehicles to maneuver without damaging the wells.
- Drilling holes will be logged to look for saturated zones and identify interbeds and marker beds.
- Wells will be screened for 40 ft. below the top of the aquifer to allow for fluctuating water levels over the course of the monitoring plan.

Six wells (PW-15 through PW 20) will be installed in the perched water zones under the following assumptions:

- Perched water wells will be placed in locations around and downgradient of the landfill and evaporation ponds.
- A maximum of three perching zones will be completed in each borehole.
- If perched water occurs when drilling wells, complete nested wells in each saturated zone. Nested wells will be grouted and at each area where perched water is encountered.

#### *5.3.20.2 Groundwater Monitoring Plan*

Groundwater monitoring will be conducted for the ICDF Complex in the SRPA and in the unsaturated zone beneath the ICDF Complex to determine whether or not ICDF waste disposal operations have resulted in a release of contaminants to the environment beneath the landfill or evaporation pond that exceed RAOs in the SRPA. Corrective actions will be evaluated and implemented, as necessary, in the event a release is identified through the groundwater monitoring program.

The ICDF Complex groundwater monitoring program will be conducted in accordance with the groundwater monitoring plan developed for the project (DOE-ID 2002e) (Appendix S). Five decision inputs have been developed in the groundwater monitoring plan to provide the necessary data to determine whether environmental releases from ICDF Complex waste disposal operations exceed RAOs in the SRPA. The decision inputs are identified in the groundwater monitoring plan (DOE-ID 2002e). Monitoring well locations and sampling frequency are also identified in the groundwater monitoring plan Samples collected as part of the groundwater monitoring program will be analyzed for the constituents indicated in the groundwater monitoring plan.

The target analyte list will be maintained for the life of the landfill. Additional analytes may be added based on the results of LCS sampling results.

In addition to the groundwater sampling that will be performed in accordance with the groundwater monitoring plan, sump sampling will be conducted to collect samples from both the LCS sump and the tertiary leak detection sumps. Samples will be collected no less frequent than annually, and will be taken following the expected maximum annual precipitation event.

### 5.3.21 Leachate Sampling and Management

The O&M plan for the ICDF landfill and evaporation pond (DOE-ID 2001f) includes details about leachate system operations, leachate system maintenance, and leachate sample collection and analysis. Leachate sample analysis will be performed to provide a signature of the landfill leachate, which can be

used in conjunction with samples collected as part of the groundwater monitoring program to determine whether an environmental release from the landfill or evaporation pond has occurred. Analytical results from the leachate can also provide information about the leachate quality over time, and be used as an indicator of potential problems in the landfill. For example, if a contaminant is detected in the leachate that is unique to a particular waste stream, it may be an indicator of a localized liner breach. Data Quality Objectives for the leachate sampling and analysis approach are presented in the O&M plan (DOE-ID 2001f). The O&M Plan is not attached to this RD/CWP, but it will be incorporated into the ICDF Complex RAWP.

## 5.4 Field Oversight/Construction Management

The DOE-ID remediation project manager is responsible for notifying the EPA and IDEQ of major project activities (e.g., project start-up or closeout) and other project activities, as deemed appropriate, DOE-ID serves as the single interface point for all routine contact between the EPA and IDEQ and the INEEL Contractor.

The INEEL Contractor is responsible for field oversight and construction management services for this project and provides health and safety, QA, and landlord services. A project organization chart and associated position description are provided in the construction HASP.

Visitors to the project site who wish to observe the ICDF landfill and ICDF evaporation pond construction must meet badging and training requirements necessary to enter INEEL facilities. Project-specific training requirements for visitors are described in the construction HASP.

## 5.5 Inspections

The following sections describe the inspections planned for the ICDF landfill and ICDF evaporation pond and associated components following their construction and prior to waste placement. Ongoing inspections will coordinate with the completion of waste placement in Cell 1, the completion of construction on Cell 2, the completion of waste placement in Cell 2, and the final cap of the ICDF landfill as well as the closure of the ICDF Complex.

During the construction phase of the ICDF landfill and ICDF evaporation ponds, additional inspections will also be performed. At their discretion, the Agency project managers or their designees may inspect the site during the construction phase to assess compliance with the RD and the procedures outlined in the CWP. These inspections may occur at any time during construction.

### 5.5.1 Construction Quality Inspections

Inspections for construction QC will be conducted in accordance with the *ICDF Construction Quality Assurance Plan* (DOE-ID 2002f) for the ICDF landfill and ICDF evaporation pond construction. These inspections are accomplished to ensure that all construction activities are in compliance with project specifications (SPC-1476) and drawings (Appendix Z). Construction QA and QC will be performed continuously during construction.

Construction QA that will be performed for the ICDF landfill and evaporation pond construction has been developed to demonstrate that the waste containment systems (e.g., landfill and evaporation pond liners, LCSs, etc.) are constructed in accordance with the design drawings (Appendix Z) and project specifications (SPC-1476). This will ultimately ensure that the waste containment systems are constructed in accordance with the design requirements (Section 2 of this RD/CWP) and the ARARs specified in the ROD (DOE-ID 1999). An independent third party will perform the construction QA.

Construction QC will also be performed during the ICDF landfill and evaporation pond construction for those project components that are not part of the waste containment systems. For example, asphalt testing for access roads will be performed to ensure that the road is constructed in accordance with the design drawings (Appendix Z) and project specifications (SPC-1476). Quality control testing does not affect ARAR compliance, but is a measure of the construction in relation to INEEL standards. Additional quality control testing may be performed in conjunction with QA testing, when required to meet INEEL standards, or when prudent to ensure QA testing requirements are met.

In any case that construction QA or QC testing fails, the construction component will be corrected to ensure compliance with the project specifications (SPC-1476), design drawings (Appendix Z), ARARs, and INEEL standards.

### 5.5.2 Prefinal Inspection

A prefinal inspection is conducted by the Agency project managers at, or prior to, completion of the ICDF landfill and ICDF evaporation pond construction. The Prefinal Inspection Checklist will be developed for use by the Agencies while conducting the inspection. The checklist encompasses the construction elements significant to meeting the ROD requirements and identifies specific activities, procedures, or other items—agreed on by all parties to be inspected—that constitute acceptance of the construction activities. The DOE-ID notifies the Agencies approximately two weeks prior to the prefinal inspection date.

### 5.5.3 Prefinal Inspection Report

Following the prefinal inspection, the Prefinal Inspection Report is prepared and submitted to the Agencies as a secondary document. Although DOE-ID responds to comments received from EPA and IDEQ, the Prefinal Inspection Report is not revised. The comments are resolved in the Final Inspection Report, which is included in the Draft Remedial Action Report, a primary document, in accordance with Section 8.4 of the FFA/CO (DOE-ID 1991). The Prefinal Inspection Report includes the following:

- Names of inspection participants
- Completed inspection checklist identifying deficiencies and/or outstanding RA requirements
- Outstanding construction requirements
- Corrective action required to resolve identified items
- Schedule for completion of corrective actions
- Date of final inspections.

All of the deficiencies and outstanding items, along with the actions required to resolve them, are identified and approved by the Agencies during the Prefinal Inspection. The Prefinal Inspection Report then documents any unresolved items and the action(s) required to resolve them.

### 5.5.4 Final Inspection

The final inspection is conducted following demobilization, when all excess materials and nonessential construction equipment have been removed from the site. Some equipment may remain on-site to repair items observed during the final inspection. The final inspection, conducted by the Agency

project managers, confirms the resolution of all outstanding items identified in the prefinal inspection and verifies that the ICDF landfill and evaporation ponds have been completed in accordance with the requirements of the ROD (DOE-ID 1999).

### 5.5.5 System Operability Testing and Startup

System operability testing and startup activities for the ICDF landfill and ICDF evaporation pond are combined into the ICDF Complex testing and startup work scope. Priorities are based on the construction completion dates and overall complex startup planning requirements.

## 5.6 Operations and Maintenance Plan

ICDF landfill and evaporation pond O&M will follow the O&M Plan (DOE-ID 2001f) that has been developed for the ICDF landfill and evaporation pond. The O&M Plan will be included in the ICDF Complex RAWP.

## 5.7 Waste Minimization Plan

Wastes will be generated as a result of the activities conducted during construction. Wastes expected to be generated include the following:

- Personal protective equipment
- Equipment spills
- Liquids from equipment decontamination
- Fencing materials
- Analytical residues
- Sample containers
- Hydraulic spills
- Miscellaneous wastes.

Waste minimization will be in accordance with the *INEEL CERCLA Disposal Facility Construction Waste Management Plan* and the INEEL Pollution Prevention Plan (DOE-ID 2000e).

Waste minimization for this project will primarily be achieved through design and planning to ensure efficient operations and avoid the generation of unnecessary wastes. This may include, but will not be limited to, the following:

- Reusing items when practical
- Segregating reusable items
- Substituting recyclable or incinerable items for disposal items

- Minimizing and avoiding use of hazardous chemicals
- Segregating contaminated from uncontaminated waste.

## 5.8 Project Cost Estimate

The project cost estimates for the ICDF landfill and ICDF evaporation pond construction, and O&M, are included in Appendix BB. The costs may be revised during subsequent submittals of this document to reflect the most current estimate.

## 5.9 Project Schedule and Sequencing

The project schedule for the ICDF landfill and the evaporation pond is provided in Appendix AA of this document. The project schedule covers all project tasks from the RD/RA SOW through completion of the RA. Administrative and document preparation activities are based on an eight-hour day, five-day week, while field activities are based on a 10-hour-day, four-day week. The schedule does not include any contingency for delay to the schedule due to late or slow document reviews, or for field activities experiencing loss of productivity because of adverse weather conditions.

## 5.10 Construction Health and Safety Plan

The construction HASP was prepared specifically for the tasks and conditions expected during implementation of this project. The HASP, which may be updated as site and project conditions dictate, includes the following elements:

- Task site responsibilities
- Personnel training requirements
- Occupational medical program and medical surveillance
- Safe work practices
- Site control and security
- Hazard evaluation
- Personal protective equipment
- Decontamination and radiological control
- Emergency response plan for the task site(s).

## 5.11 Waste Management Plan

Wastes resulting from the construction of the ICDF Complex will be managed on-Site as CERCLA waste in accordance with the final OU 3-13 ROD, *ICDF Construction Waste Management Plan* (DOE-ID 2002g), the associated disposal facility WAC, and other appropriate regulations, as necessary. All ICDF landfill and ICDF evaporation pond construction activities take place within the WAG 3 AOC

to allow flexibility in managing the consolidation and remediation of wastes without triggering LDRs, in accordance with the OU 3-13 ROD (DOE-ID 1999).

### 5.11.1 Construction Waste Management

Management of wastes generated from construction of the ICDF landfill and ICDF evaporation pond are addressed in the *ICDF Construction Waste Management Plan* (DOE-ID 2002g) provided as an attached document to this RD/CWP. The WMP provides identification of each of the waste streams, describes waste minimization actions, and provides requirements for waste transportation, waste storage, and ultimate disposal.

### 5.11.2 Operations Waste Management

Waste generated from the operations of the ICDF Complex will be addressed in the ICDF Complex Waste Management Plan. This plan will describe the anticipated waste streams, detail the waste characterization actions, and provide the requirements for waste minimization, packaging, transportation, storage, and ultimate disposition. The ICDF Complex WMP will be included with the ICDF Complex RAWP.

## 5.12 Spill Prevention/Response Program

During the ICDF landfill and ICDF evaporation pond construction, all hazardous materials are stored and handled in a safe manner to prevent leaks and spills. Preventative spill containment is required and implemented per the applicable material safety data sheets and manufacturers' recommendations. Any inadvertent spill or release of potentially hazardous materials (i.e., equipment fluids), is subject to the substantive requirements in the following:

- INEEL Emergency Plan RCRA Contingency Plan (PLN-114)

- INEEL Emergency Preparedness—Addendum 2, Idaho Chemical Processing Plant (PLN-114-2) as described in the HASP for construction of the ICDF landfill and ICDF evaporation pond, and as described in the ICDF operations HASP (INEEL 2002a).

During operations at the ICDF landfill and ICDF evaporation pond, the spill prevention/response program falls under the ICDF Complex Spill Prevention/Emergency Response Program, as described in the *Health and Safety Program for INEEL CERCLA Disposal Facility Operations* (INEEL 2001a). This emergency response plan addresses Operation Safety and Health Administration "emergency response" as defined by 29 CFR 1926.65, "Hazardous Waste Operations and Emergency Response," and DOE "emergencies" as defined by DOE Order 151.1A, "DOE Comprehensive Emergency Management System," and DOE Order 232.1A, "Occurrence Reporting and Processing of Operations Information." This response plan is implemented in concert with the INEEL Emergency Plan RCRA Contingency Plan (PLN-114), which has been revised to include the ICDF Complex.

The INEEL Emergency Plan RCRA Contingency Plan may be activated in response to events occurring at the INTEC or at the ICDF Complex or at the discretion of the emergency action manager (EAM). Once the INEEL plan is activated, ICDF operations personnel will follow the direction and guidance communicated by the EAM.

## 5.13 Remedial Action Report

The remedial action report will be prepared following demobilization and restoration of the site, and submitted to the agencies as a primary document. In accordance with the FFA/CO, the RA report will be submitted within 60 days of the final inspection. The RA report will include the following:

- A synopsis of the construction work defined in the RD/CWP and certifications that this work was performed.
- Any modifications made to the RD during the construction phase, including the purpose of the performed modifications and results of the modifications.
- Problems encountered during the construction and resolutions to these problems.
- Any outstanding items from the Prefinal Inspection Report that were identified and described; in responding to comments received, the Prefinal Inspection Report will not be revised, but rather will be finalized in the context of the RA report.
- Discussion of the results of the final inspection.
- O&M plan update.
- As-built drawings showing final contours and final configurations for crest pad buildings and associated equipment and instrumentation.
- Final total costs for this portion of the RA and a projection of future operational expenditures.

## 5.14 Closure Activities

The ICDF landfill and ICDF evaporation pond for the RA will be closed following final waste placement during the operational period. Closure of the ICDF landfill and ICDF evaporation pond will be in accordance with the ARARs identified in the ROD (DOE-ID 1999), and as described in the ARAR compliance strategy included with the Technical and Functional Requirements (TFR-71, Appendix CC). Closure plans and supporting information shall be provided to the Agencies prior to initiation of closure activities for Agency acceptance. Specific closure discussions regarding the ICDF landfill, evaporation pond, SSSTF, and ancillary facilities will be provided in the ICDF Complex RAWP. It is the goal to close all ICDF units under a "clean" closure, except for the ICDF landfill.

# 6. FIVE-YEAR REVIEW

The NCP (EPA 1990) requires a review of the selected remedy every five years where contamination is left in place above risk-based concentrations. This review evaluates the remedy to determine if it continues to protect human health and the environment. The operational life of the ICDF Complex is 15 years, but five-year reviews will be conducted at the site at least until 2095 (at the end of the DOE-ownership institutional control period). Five-year reviews may be suspended before that time if it is determined that institutional controls and reviews are no longer necessary. This RD/CWP does not identify elements of the five-year review. Rather, requirements for the first five-year review (as well as subsequent evaluations) will be developed and addressed in the ICDF Complex RAWP. All portions of OU 3-13 will be evaluated in a single periodic five-year review. Five-year reviews will note any changes in the physical configuration of the area, and will determine whether OU 3-13 can continue to be managed to achieve the remediation goals outlined in the OU 3-13 ROD. As part of the review process, the Agencies will periodically review the protectiveness of their decisions and adjust to updates in public protectiveness levels. ICDF landfill and evaporation pond closure requirements will include access restrictions with a buffer zone around the landfill, and access restrictions and institutional controls as long as the landfill contents remain a threat to human health and the environment.

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